Exploring the impact of behaviorally enacted vs. imaginal delivery of an acceptance-based metaphor on acute panicogenic distress in acceptance and commitment therapy: a comparative evaluation

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EXPLORING THE IMPACT OF BEHAVIORALLY ENACTED VS. IMAGINAL DELIVERY OF AN ACCEPTANCE-BASED METAPHOR ON ACUTE PANICOGENIC DISTRESS IN ACCEPTANCE AND COMMITMENT THERAPY: A COMPARATIVE EVALUATION

by

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EXPLORING THE IMPACT OF BEHAVIORALLY ENACTED VS. IMAGINAL DELIVERY OF AN ACCEPTANCE-BASED METAPHOR ON ACUTE PANICOGENIC DISTRESS IN ACCEPTANCE AND COMMITMENT THERAPY: A COMPARATIVE EVALUATION

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Abstract

Metaphors, or indirect and less literal forms of communication in the therapeutic setting, can be powerful and clinically impactful components of psychosocial interventions. Metaphors are widely used in therapeutic practice, and rest at the core of newer third generation behavior therapies such as Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 2011). Yet, to date, systematic empirical evaluations of the effectiveness of metaphor in the treatment of anxiety disorders and other forms of psychopathology have been largely ignored. Thus, the present study aimed to evaluate the impact of an ACT-relevant metaphor on acute panicogenic distress (i.e., panic-like symptoms). Specifically, this experiment was designed to provide a comparative evaluation of imaginal delivery of metaphor relative to behaviorally enacted delivery of metaphor. Moderate-to-high anxiety sensitive females (N = 98) were randomized to one of two conditions 1) imaginal or 2) behaviorally enacted delivery, consisting of an ACT metaphor (i.e., Chinese Finger Trap Metaphor). Within each condition, there was a core therapeutic message encouraging acceptance of one’s unpleasant thoughts, feelings and bodily sensations. Participants were then exposed to two 5-minute inhalations of 10% carbon dioxide enriched air (CO₂) that slowly induced panic-like symptoms, while being encouraged to use the strategy that they learned. The acute impact of each condition was assessed after baseline, each 5-minute CO₂ trial, and recovery on response domains that included heart rate, subjective self-report and behavioral avoidance. As predicted, the behavioral delivery of metaphor produced better outcomes in all domains than imaginal delivery. These results have clinical implications for the delivery of metaphorical strategies in the treatment of anxiety disorders and psychopathology more generally.
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Introduction

Clinicians and researchers alike are engaged in ongoing efforts to discover ways to increase the effectiveness of psychotherapy and to facilitate positive treatment outcomes. Typically, therapists only have a limited amount of time each week to communicate therapeutic information, which often includes instruction, explanation or questioning. For instance, cognitive restructuring (i.e., hypothesis testing, Socratic questioning) is commonly used in treatment to identify and challenge maladaptive or irrational thoughts. Indeed, conducting therapy without any direct literal communication would be very difficult. However, literal, straightforward language has its limits and may not always be salient and memorable enough to facilitate long term behavior change (Otto, 2000). Additionally, from the perspective of newer acceptance- and mindfulness-based approaches such as Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 2011), literal language can lead to human suffering when people use language components rigidly and inflexibly, or in instances when language is applied in ways that are contraindicated and unhelpful (Hayes et al., 2011; Varra, Drossel, & Hayes, 2009).

For this reason, other clinically impactful forms of communication, including stories, metaphor, paradox and analogies are often used in therapy. Such less direct and more metaphorical forms of communication (e.g., the Passengers on the Bus Metaphor [Hayes, Strosahl & Wilson, 1999] or the leaves on a stream mindfulness-based exercise [Luoma, Hayes & Walser, 2007) are common within newer acceptance- and mindfulness-based approaches such as ACT and are used to facilitate change by altering the ways that clients relate to their unpleasant thoughts and feelings (Forsyth & Eifert, 2008; Hayes et al., 2011; Luoma et al., 2007). In general, metaphor has a long history within therapeutic
practice and is often a useful alternative to more literal and direct language. This is the case across various therapeutic approaches, not only including ACT and other acceptance-based treatments (e.g., Dialectical Behavior Therapy [DBT]; Linehan, 1993), but also psychodynamic, humanistic, emotion-focused and cognitive behavioral approaches. Metaphors are useful for a number of reasons, including their ability to make therapeutic information easier to understand and remember, to facilitate new perspectives about difficult situations, and to foster greater emotional impact (Blenkiron, 2010; Hayes et al., 2011; Martin, Cummings & Hallberg, 1992; Otto, 2000).

For decades, studies have been conducted providing conceptualizations of metaphor, evaluations of the frequency of metaphor use, qualitative interpretations of how certain therapeutic metaphors produce their effects, and rich examples of potential uses of metaphor in therapy. Yet, systematic empirical evaluations of the clinical impact of metaphor in psychosocial interventions are surprisingly limited. Additionally, despite its advantages and common use, no studies to date have evaluated the effectiveness of metaphor, and particularly how metaphor can be delivered most effectively, in the treatment of anxiety pathology, within an acceptance context. However, the comparison of different delivery methods, and particularly imaginal (i.e., verbally-instructed) versus behaviorally enacted metaphor, is important given the renewed interest in acceptance-based interventions in clinical science and practice. Moreover, such a comparison allows for the evaluation of whether actually acting out an acceptance-based metaphor makes it more effective, and thus leads to better outcomes (e.g., less subjective distress), relative to simply describing and having individuals imagine it. Indeed, it has been suggested that offering a metaphor within a behavioral framework may serve to increase the salience,
meaning and impact of the metaphor (Eifert & Forsyth, 2005; Eifert & Heffner, 2003), in part, because the actual enactment of a metaphor involves behavior change, or doing something new. Despite the potential advantages of acting out a metaphor, its delivery is often imaginal rather than behavioral in the acceptance literature and in practice.

In light of such issues, the purpose of the present experiment was to evaluate the relative impact of an acceptance-based metaphor when imagined versus behaviorally enacted within the context of ACT. A sample of females (N = 98) who are high in anxiety sensitivity (i.e., fear of anxiety-related symptoms; Reiss, Peterson, Gursky & McNally, 1986) were recruited through the University at Albany subject pool and through flyers posted on campus. The sample consisted of high anxiety sensitive females because: 1) anxiety pathology is overrepresented in women, 2) the use of a homogenous female sample was expected to reduce variability and thus lead to more powerful effects and 3) higher anxiety sensitivity (a risk factor for panic symptoms) was expected to increase the salience of the CO₂-enriched air procedure. Participants were randomly assigned to watch one of two videos teaching them an acceptance strategy to use during the procedure, either via 1) imaginal delivery, in which participants imagined a commonly used ACT metaphor (i.e., the Chinese Finger Trap Metaphor; Eifert & Heffner, 2003; Hayes et al., 1999) or 2) behavioral delivery, in which participants acted out the same metaphor with an actual finger trap and had it modeled to them in the video. All scripts were written so that participants received the same acceptance message to apply to various thoughts, physical sensations, and social situations related to anxiety sensitivity.

Participants learned to use the strategy during two 5-minute panicogenic inhalations of 10% CO₂-enriched air and a 5-minute post-challenge recovery period while
heart rate and self-report ratings on several emotional and avoidance domains were measured. Additionally, participants initiated each of the 5-minute CO₂ trials themselves, and decided whether or not to participate in a third CO₂ inhalation, in order to assess for behavioral avoidance or conversely willingness. Finally, participants were asked about actual use, usefulness, meaning and impact of the intervention post-challenge.

This study aims to extend the work of others that have systematically evaluated the effectiveness of metaphor as a therapeutic approach (e.g., Donnelly & Dumas, 1997; Martin et al., 1992; McMullen et al., 2008) as well as studies examining the use of acceptance-based approaches for anxiety pathology (e.g., Arch et al., 2012; Campbell-Sills, Barlow, Brown & Hofmann, 2006; Eifert & Heffner, 2003; Levitt, Brown, Orsillo & Barlow, 2004). Results are expected to have important practical implications for therapists and advance our understanding of the delivery of metaphor, specifically the usefulness of acting out metaphor in therapy, relative to imaginal applications.

The next portion of the paper presents a summary of the relevant literature related to how metaphor is defined, its linguistic functions, and its use in everyday language and in psychotherapy, particularly within acceptance-based treatments. This section will end with a summary of the current status of the literature to date, and then introduce an experiment that addresses its limitations. This review will start by laying out the complexities of defining metaphor.

**Literature Review**

**Metaphor Defined**

The idea of metaphor originated as early as Aristotle, who defined metaphor as applying a word to one thing that belongs to another thing (e.g., from a genus to a
species, species to a genus, or a species to a species; Barker, 1985). More modern
definitions conceptualize metaphor in a similar way. For instance, based on the
MerriamWebster.com (2011) definition, metaphor is defined as a figure of speech in
which a word or expression representing one type of object or idea replaces another
comparable object or idea. As another example, OxfordDictionary.com (2011) defines
metaphor as one thing that is considered symbolic of something else.

In general, metaphor has been defined in similar ways across a vast range of fields
including philosophy, literature, politics, medicine and psychology (Ingram, 1994; Lakoff
& Johnson, 1980; McCurry & Hayes, 1992). However, a review of a sample of
definitions of metaphor drawn from the psychology literature alone suggests that
definitional problems are inherent. For instance, some definitions focus on the similarities
between two things whereas others focus on their differences. Additionally, some authors
use the term metaphor to refer to all figurative language (McMullen, 1989; 1996). Indeed,
psychologists who emphasize the applied uses of metaphor often define it more liberally
as anecdotes, stories, allegories (i.e., an extended metaphor in which a story depicts an
important characteristic of the subject), parables and fables (i.e., extended metaphors in
which a moral lesson is learned; Campbell & Katz, 2006; McCurry & Hayes, 1992; Stott,
Mansell, Salkovskis, Lavender & Cartwright-Hatton, 2010). Metaphor has even been
defined as the association between two nonverbal domains of experience such as images,
symbols or objects (Forceville, 2008; Stern, 2000).

Overall, defining and conceptualizing metaphor is a very complex task and one
that has been difficult to agree upon. For present purposes, this review will largely focus
on studies which use a more liberal definition of the term because metaphor is commonly
referred to as figurative language more broadly in psychotherapy (Barker, 1985; McMullen, 1989; 1996). The present study conceptualizes metaphor in a way that largely resembles the MerriamWebster.com dictionary definition (i.e., a thing that is illustrative of one object or idea replaces another). However, the focus of the commonly used ACT metaphor used in this study (i.e., the Chinese Finger Trap Metaphor; Hayes et al., 1999) is on functional rather than structural similarity. Indeed, many commonly used ACT metaphors appear to consist of functional comparisons.

**The Linguistic Functions of Metaphor**

Metaphor, most simply, is a linguistic comparison in which A is B (Stern, 2000). More technically, metaphor is considered to have three parts: the topic, the vehicle and the ground (Glucksberg, 2003; McCurry & Hayes, 1992; McGlone & Manfredi, 2001; Stewart & Barnes-Holmes, 2001). As an example, in the phrase “My mind is playing tricks on me,” the topic is what is referred to literally (i.e., the mind) and the vehicle is the term being used metaphorically (i.e., playing tricks). The ground is the increased meaning that is created from combining the two terms (i.e., the mind playing tricks is a form of self-deception). Through the use of metaphor, meaning is transferred to the topic that might not be considered otherwise (Campbell & Katz, 2006; Glucksberg, 2001; McGlone & Manfredi, 2001). In order for metaphor comprehension to occur, an individual has to recognize similarities between the vehicle and the topic and then relate them to one another (Glucksberg & Keysar, 1993; 2003; McGlone & Manfredi, 2001). As a commonly used example in ACT (i.e., struggle and suppression of unpleasant emotions tends to potentiate the frequency and intensity of unpleasant private events; Stewart & Barnes-Holmes, 2001; Wegner, Schneider, Carter & White, 1987), struggling
with anxiety is considered a topic, struggling to get out of quicksand is the vehicle, and the common ground or similarities between them is that struggling just gets you deeper into trouble (i.e., you end up sinking).

From a linguistic standpoint, metaphor is largely considered to be asymmetrical, meaning that the similarity between two inverse statements is not considered equal (Deane, 1993; Leezenberg, 2001; McCurry & Hayes, 1992). For example, the metaphorical statement, “People are computers” makes more sense than the statement “Computers are people,” namely because people are thought of as information processing machines just like the computers that we have created (Deane, 1993). Often if a metaphor is reversed (i.e., the vehicle becomes the topic and the topic the vehicle), its properties change entirely (Connor & Kogan, 1980). Using the quicksand example, in the context of psychotherapy it makes more sense that an anxiety struggle is the topic and quicksand is the vehicle rather than the other way around. As in this example, the topic is typically something more abstract and the vehicle is something more concrete (Deane, 1993).

The term metaphor is often used interchangeably in psychotherapy and other contexts with similar terms such as simile and analogy. In linguistics, however, the term metaphor technically differs from simile, which makes an explicit comparison between concepts (i.e., A is like B; e.g., my love is like a red, red rose) or analogy, which emphasizes the structural characteristics of a comparison (i.e., A is structurally similar to B; I feel like a fish out of water; Blenkiron, 2010; Chiappe & Kennedy, 2001). Metaphor is also distinguished from an idiom, or a metaphorical expression that means something distinct from the actual meaning of the words that comprise it, which has become frozen in everyday language (e.g., beating around the bush; Gibbs, 1994).
A psycholinguistics literature has emerged on metaphor which emphasizes the mechanisms of metaphor development, comprehension, memorability and use at a molecular level. Studies have been conducted, for instance, examining whether we understand metaphorical meaning as quickly as literal meaning. As an example, Stewart and Heredia (2002) found that when presented with metaphorical references (i.e., the nonliteral meaning of a word, “creampuff”, was implied by the context) and literal references (i.e., the word, “creampuff” was used to describe a pastry), participants \((N = 141)\) understood metaphorical language as quickly as literal references.

Several theories within the psycholinguistics literature have been developed to facilitate the understanding of how metaphors are comprehended. For instance, from the perspective of comparison theories, metaphor comprehension involves identifying similarities between the topic and vehicle, and then making a comparison between them (Campbell & Katz, 2006; Levinson, 1983, McCurry & Hayes, 1992). Anomaly models, in contrast, assume that metaphorical language happens after similarities between the topic and vehicle are difficult to find (Cornell-Way, 1994; Glucksberg, 2003). For example, calling a person a rock yields an anomaly (i.e., a person is animate whereas a rock is inanimate). Because this statement is not logical from a literal perspective, it triggers a search for metaphorical meaning (McCurry & Hayes, 1992). Interaction theories view metaphor comprehension as a function of relationships between the topic and the vehicle (Cornell-Way, 1994; Gibbs, 1994). To provide a concrete example, in the statement “a hawk is the shark among birds” (Gibbs, 1994, p. 242), the topic and vehicle are bird and fish types respectively, which can be categorized as aggressive in their specific domains (Gibbs, 1994). Studies in the psycholinguistic literature are also
concerned with developmental issues and cultural issues related to metaphor comprehension (McCurry & Hayes, 1992).

Although the psycholinguistics literature has facilitated our understanding of metaphorical language at a molecular level, it largely ignores the practical implications of metaphorical talk in both everyday language and psychotherapy. Because the present study focuses on the pragmatic impact of metaphor, a more detailed account of the psycholinguistics of metaphor is beyond the scope of this paper.

**Metaphor in Everyday Language and Across Disciplines**

Metaphors show up in everyday language, often without realization, to describe and clarify our actions, to convey subtle meanings, or to impart novel perspectives. For example, when we say “life is a journey” or “my mind is a blank slate” or “I feel trapped,” we are using metaphor. According to Lakoff and Johnson (1980), metaphor is ubiquitous not only in our communication but also in our thoughts and actions, a view embodied by the term, “conceptual metaphor”. For example, metaphorical phrases used to describe arguments such as “you’re wasting my time” are based on a cognitive framework of “time is money” (Lakoff & Johnson, 1980, p. 13).

Several hypotheses have emerged in the literature to understand why people use metaphor so readily in everyday language. For instance, the inexpressibility hypothesis states that certain concepts are particularly difficult to express without resorting to metaphorical language (Ortony, 1993). As another hypothesis (i.e., the compactness hypothesis), metaphor can provide a rich and efficient way to communicate information (Thomas, 2001). Lastly, a third hypothesis posits that metaphor makes the communication of information more memorable through vivid imagery (Ortony, 1993).
Because of its broad ranging benefits, metaphor and other types of figurative language (e.g., stories, fairy tales, parables and fables) have been used throughout history and across diverse cultures to communicate information, teach values, persuade, or facilitate information comprehension. The literature on metaphor is vast and this type of communication is used in various forms across several disciplines. In poetry and literature for instance, speech and writing abound with metaphor, often used for aesthetic purposes, such as Shakespeare’s comparison of the world to a stage and people as its players, or Robert Frost’s comparison of an individual’s life to a journey (Steen, 1994). In philosophy, metaphor is used to foster understanding related to philosophical theories, a philosophical problem, or even a whole philosophical system (Hoffman, 1985; Rohrer, 1995). Metaphorical language is also commonly used in politics to describe strategies and even politicians themselves (Musolff, 2004; Stott et al., 2010).

In the field of psychology, either the psycholinguistic or applied aspects of metaphor (i.e., the use and benefits of using metaphor as a technique in psychotherapy) are emphasized. While the psycholinguistics literature focuses on the mechanisms of metaphor comprehension, the clinical literature emphasizes the use and potential benefits of metaphor as a technique. For the purposes of the study presented here, the remaining review will focus on the applied uses of metaphor in psychotherapy.

**Metaphor Use in Psychotherapy**

The use of metaphor as a technique in psychotherapy, albeit largely unsystematic, has a long history. Some of the first psychologists to use metaphor were Erikson and Adler, who considered it essential to incorporate metaphor and stories into therapeutic work (Kopp, 1998; Stott et al., 2010). Therapists still commonly use metaphor to
facilitate communication related to a client’s presenting problems as well as desired therapeutic outcomes (Berlin, Olson, Cano & Engel, 1991; Burns, 2007; Evans, 1988; Cirillo & Crider, 1995; Sledge, 1977). More specifically, therapists often use metaphor to explain abstract concepts or messages in terms of concrete concepts or objects (Lyddon, Clay & Sparks, 2001; Stott et al., 2010) or at times when treatment reaches an impasse (Burns, 2007). Barker (1996) classified metaphor liberally as a therapeutic technique that includes: 1) short stories that focus on specific goals; 2) analogies, similes or other figurative statements that emphasize certain points; 3) the use of one relationship as a metaphor for another; 4) activities with metaphorical meaning that can be carried out by clients between sessions; and 5) metaphorical objects used symbolically in treatment.

Metaphors are also frequently used by clients (i.e., client-generated metaphors; Burns, 2007) to express thoughts, memories and emotions which are too painful to express via literal language, to characterize clients’ relationships with others or to communicate therapeutic goals (Milioni, 2007; Zuniga, 1992).

The use of metaphor as a technique in psychotherapy, whether defined technically or more liberally, has many important advantages. Metaphor is often used to increase client awareness and understanding and to facilitate client change (Boone & Bowman, 1997; Cirillo & Crider, 1995; Close, 1998). Additionally, metaphor has been found increase the memorability and impact of information. For instance, Martin et al. (1992) intentionally manipulated metaphor in therapy sessions, using metaphor in some sessions but not others. Clients rated the sessions in which metaphor was used as more memorable than sessions where no metaphor was used. Moreover, they rated the sessions in which they remembered metaphors as significantly more helpful than sessions where they did
not remember any metaphors. Participants cited several reasons for better recall of metaphors relative to literal language, including increased emotional awareness and understanding of therapeutic information. As another example, in a study in which participants were asked to read vignettes about common stressors faced by college students, participants rated metaphorical advice as significantly more helpful, with respect to reducing emotional distress, than literal advice (Donnelly & Dumas, 1997).

Beyond the ability of metaphor to enhance the understanding, memorability and perceived usefulness of therapeutic information, the use of metaphor may allow for a concrete reevaluation of difficult situations, resulting in those situations being perceived as less scary and troublesome (Blenkiron, 2010; Close, 1998). Metaphor may also be more meaningful emotionally relative to literal explanation, and thus has a greater likelihood of influencing a person’s behavior and contributing to positive outcomes (Eifert & Forsyth, 2005; Hayes, & Wilson, 1994; Heffner, Greco & Eifert, 2003). Enacting metaphors behaviorally, rather than just verbalizing them, may facilitate client confidence in positive change by creating the opportunity for them to have a wider range of new and meaningful behavioral experiences, which may further help them achieve therapeutic goals (Baker, 1996; Burns, 2007). Overall, empirical evidence supporting the benefits of metaphor in psychotherapy is promising but warrants further consideration.

Apart from its general benefits, metaphor is thought to enhance the impact of intervention technologies, more specifically, across diverse theoretical orientations. For example, within psychodynamic therapy, metaphor may be used to facilitate the confrontation of unconscious material that may be threatening in some way (e.g., a traumatic experience; Enckell, 2002; Rasmussen, 1995; Zuniga, 1992). Several
traditional studies have been conducted examining the benefits of metaphor within a psychodynamic framework and have shown that metaphor enhances insight, increases a client’s engagement in therapy and improves the therapeutic relationship (Adams & Chadbourne, 1982; Angus, 1996; Angus & Rennie, 1989; Arlow, 1979; Barlow, Pollio & Fine, 1977; Borbely, 2004; Fine, Pollio & Simpkinson, 1973; Gindhart, 1981; Gore, 1977; Hill & Reagan, 1991; McMullen, 1989; 1996; Pollio & Barlow, 1975; Rasmussen & Angus, 1996; Long & Lepper, 2008; Stine, 2005; Strong, 1989). However, many of these studies did not use sound empirical designs and are outdated. Thus, new studies are necessary to substantiate these findings.

As the name sounds, an offshoot of psychodynamic therapy, metaphor therapy, conceptualizes metaphor as central to psychological treatment (Kopp, 1995). From this perspective, metaphors symbolically represent a client’s problems or new more adaptive solutions. More specifically, metaphor is considered an indirect way of dealing with unconscious material without directly bringing it into consciousness, so that clients may deal with thoughts and feelings that have been previously repressed (Kopp, 1995; Dwairy, 1997). According to the biopsychosocial model of metaphor therapy, metaphor represents the person through the physical body, the unconscious, and through figurative language that encompasses their social and cultural experiences (Dwairy, 1997). Grove & Panzer (1989) also uses the term metaphor therapy more specifically to deal with unconscious traumatic experiences through the use of metaphorical language. Metaphor therapy often uses the client’s own metaphorical language to facilitate change in therapy. For instance, if a client says “I keep running against a wall,” the metaphorical statement is broken down (e.g., what kind of wall it is, its size and shape) as symbolic of the
unconscious material that contributes to the tendency for this person to repeat particular behaviors over and over again (Dwairy, 2009; Kopp, 1995).

Metaphor also has a long-standing history within the person-centered and experiential approaches. For instance, in humanistic therapy, metaphors are used to support a client in coping with current difficulties and to help clients grow and mature in order to achieve self-actualization (i.e., to realize one’s full potential; Blenkiron, 2010; Kopp, 1995; Sachse & Elliot, 2002). Additionally, from the perspective of emotion-focused therapy, metaphor is used to describe the inner emotional experience of the “self” (e.g., a volcano erupting in the chest is used to describe heaviness and other aversive sensations due to anxiety; Mendes et al., 2010; Parker & Wampler, 2007). Despite its common use, the systematic study of metaphor as an effective technique within these approaches is limited.

Within the behavioral tradition, metaphor has been used to achieve a wide variety of intervention goals. Behavioral therapists have focused on the functional benefits of discussing client target behaviors (i.e., core problematic behaviors) indirectly using metaphor (McCurry & Hayes, 1992) versus more literal language. Additionally, metaphor has been used within behavioral activation interventions to discuss problematic behaviors in a more memorable and clinically impactful way and help an individual move toward valued directions (e.g., successfully moving through a hierarchy of reinforcing activities or achieving goals consistent with values; Hopko, Lejuez & Hopko, 2004).

Cognitive Behavioral Therapy (CBT) also employs metaphor (e.g., Blenkiron, 2005; Kopp & Craw, 1998) within the therapeutic context. Within CBT, metaphor can be used to confront irrational cognitions and help to create newer more adaptive beliefs
(Blenkiron, 2010; Goncalves & Craine, 1990; Otto, 2000). As an example, Otto (2000) described a salient metaphor consisting of a stone “depression gargoyle.” This gargoyle sits on client’s shoulders, induces blame and whispers critical comments in their ears (e.g., that they are doing everything wrong), which wears them down. Clients may be given such metaphors to help them identify and replace distorted cognitions (e.g., “I cannot do anything right”) with more adaptive ones, even if their distorted cognitions have become enduring and comfortable patterns (Otto, 2000).

Limited studies have evaluated the clinical impact of metaphor in CBT. For instance, the use of metaphor in group CBT for the formulation and treatment of low self-esteem, anxiety, and depression has been shown to enhance memory and learning (Rigby & Waite, 2006). Studies within the CBT literature have also directly evaluated the usefulness of metaphorical language. Specifically, Heffner et al. (2003) investigated preference for, and compliance with, literal versus metaphorical language commonly used to teach progressive muscle relaxation (PMR) to children. Thirty-three non-clinical preschool children were taught to do progressive muscle relaxation using both direct (e.g., squeeze your shoulders up to your ears) and metaphorical (e.g., pretend you are a turtle going into its shell) language. Results showed that all children ($N = 33$) preferred learning PMR through metaphorical language compared to literal language.

No other approaches seem to emphasize the use of metaphor as a technique more than newer acceptance- and mindfulness-based approaches such as Mindfulness-based Cognitive Therapy (Segal, Teasdale, & Williams, 2004), DBT (Linehan, 1993), DBT and ACT (Hayes et al., 2011). However, before discussing the use of metaphor within newer acceptance- and mindfulness-based approaches, the term acceptance (as used within the
context of psychotherapy) will be introduced and the utility of acceptance-based interventions will be discussed more broadly.

**Acceptance in Psychotherapy**

Acceptance-based ideas have a long history within psychology. The use of the term acceptance, literally meaning to take what is offered (Merriam Webster Dictionary, 2011), is just as complex as that of metaphor. Complexities often arise in terms of 1) conceptual definitions of and methods used to facilitate acceptance, 2) whether the focus is on acceptance of the self, others or the human experience in general, 3) whether the focus is on acceptance of the client by the therapist or of helping the client accept him or herself, and 4) whether acceptance is considered a process or an outcome (Hayes, 1994; Hayes & Pankey, 2003; Williams & Lynn, 2010). For instance, Carl Rogers used the term unconditional positive regard to describe the complete acceptance of a person irrespective of what they say or do (Rogers, 1961; 1985). More recently, acceptance (a.k.a experiential acceptance) has been defined as the willingness to experience internal events such as thoughts, feelings, memories, and physiological sensations more openly and completely (Hayes et al., 2011; Orsillo, Roemer, Block-Lerner, & Tull, 2004). From this perspective, acceptance is about approaching and making contact with thoughts, emotions and life events by experiencing them directly just as they are (Hayes, 1994). Put another way, acceptance is “allowing, tolerating, embracing, experiencing, or making contact” with something that formerly induced escape or avoidance (Hayes & Pankey, 2003, p. 4).

Indeed, newer definitions tie acceptance closely to mindfulness and making contact with present moment experience. For instance, Linehan (1993) described acceptance as an experiential openness to whatever is occurring in the current moment.
Experiential acceptance within a clinical context can paradoxically be one of the most impactful forms of change (despite its divergence from the use of change strategies themselves; Dougher, 1994; Eifert & Forsyth, 2005; Hayes, 1994; Hayes et al., 2011).

Experiential acceptance from a clinical standpoint differs from being passive or giving up (Forsyth & Eifert, 2008; Hayes et al., 2011). It involves directly contacting thoughts, feelings, events or experiences that have previously been avoided just as they are. For example, acceptance of anxiety involves acknowledging its presence and consciously exploring how it feels to be anxious. Distinguishing active from passive acceptance has been likened to the serenity creed: accepting or letting go of the struggle with what cannot be changed, being courageous enough to change what you can, and developing the wisdom to understand the distinction (Dahl & Lungren, 2006; Eifert & Forsyth, 2005). Active acceptance comprises taking a mindful and nonjudgmental stance toward oneself and the world characterized by compassion, kindness, being present and a willingness to move in valued directions (Eifert & Forsyth, 2005; Kabatt-Zinn, 2003).

Due to its potential benefits, acceptance has been referred to as a “common factor” (i.e., one that is important in all psychosocial interventions) in the psychotherapy literature (Ackerman & Hilsenroth, 2003; Arkowitz, 1997). However, it has been emphasized in some therapeutic approaches more than others. For instance, the early theories of Freud (1920) stress the importance of emotional acceptance. Specifically, psychodynamic theorists believed that unconscious avoidance of painful thoughts and feelings resulted in psychopathology, and a central theoretical tenet underlying psychodynamic therapy is the necessity of alleviating repression (and other forms of avoidance) via acceptance (Block-Lerner, Wulfert & Moses, 2009; Hayes & Pankey,
Additionally, variations of therapist- and client-focused acceptance are central to humanistic and existential psychotherapies (Rogers, 1985; Sasche & Elliot, 2002; Schneider & Krug, 2010; Williams & Lynn, 2010). Specifically, clinicians within these approaches, particularly humanistic approaches, focus on acceptance in terms of the therapist’s relationship with the client, with the goal being that the therapist provides an accepting, unconditional, consistent, genuine, and noncritical therapeutic stance (i.e., unconditional positive regard) in order to further facilitate self-acceptance in the client (Cain, 2002; Williams & Lynn, 2010).

Although not a major focus of traditional CBT’s, newer behavioral approaches, similar to humanistic and existential psychotherapies, have emphasized acceptance as a major focus of treatment. Acceptance-based approaches in behavioral therapies arose out of concerns that client’s often present with difficulties that are not responsive to more direct change strategies (e.g., targeting and attempting to eliminate psychological and emotional distress; Cordova, 2001; Cordova & Kohlenberg, 1994). There may be several reasons for this including: 1) the process of change is in contradiction to the outcome (e.g., attempting to distract oneself so as not to think of a thought makes one think of that thought more; Wegner et al., 1987), 2) change strategies contribute to maladaptive avoidance of unwanted thoughts and feelings and the circumstances in which they occur (e.g., deliberate attempts to change a thought or feeling implies that the thought or feeling is unacceptable), 3) attempts to change other individuals creates conflict in relationships whereas acceptance improves those relationships, or 4) something has to be learned by doing rather than via instruction (Hayes, 1994). Acceptance-based approaches that arose out of and have attempted to allay such concerns include DBT, MBCT, FAP and ACT.
Acceptance- and Mindfulness-Based Approaches. DBT is a newer acceptance- and mindfulness-based approach that balances radical acceptance (i.e., the fully open experience of what is just as it is, without constraints, evaluation or modification) with change strategies in the treatment of psychopathology (Hayes & Linehan, 2004; Linehan, 1993). From a DBT perspective, psychopathology occurs when clients are unwilling to accept the ups and downs of thinking and feeling, which further contributes to severe escape attempts such as parasuicidal behaviors (i.e., nonfatal, self-harming behavior conducted with the intention of harming or killing oneself; Cordova & Kohlenberg, 1994; Linehan, 1993; Linehan, Heard, & Armstrong, 1993). Several studies have been conducted attesting to the effectiveness of DBT in individuals with borderline personality disorder, depression, anxiety, and eating disorders, to name a few (see Chapman, 2006 for a review). Moreover, DBT is considered a “well-established treatment” for borderline personality disorder based on the APA’s Division 12 Task Force Criteria (Chambless et al., 1998).

Other newer approaches also emphasize acceptance in the context of psychotherapy. For instance, FAP emphasizes experiencing one’s feelings in difficult interpersonal relations without attempts to escape, avoid or criticize one’s own emotions or the other person (Cordova & Kohlenberg, 1994; Kohlenberg & Tsai, 1991). As another example, MBCT involves accepting thoughts and feelings nonjudgmentally instead of attempting to eliminate them, with a goal of correcting cognitive distortions (Segal, Williams, & Teasdale, 2002). Both FAP and MBCT have been largely supported in the empirical literature.
From an ACT perspective, acceptance is an alternative to experiential avoidance (EA), or an unwillingness to experience unpleasant bodily sensations, thoughts, feelings or memories, and efforts to avoid such internal events or the situations that contribute to them; Chawla & Ostafin, 2007; Hayes et al., 2004; 2011). EA is not considered problematic in and of itself if applied flexibly in the short-term; however, it may lead to human suffering when individuals repeatedly engage in rigid and inflexible tendencies to manage or avoid unpleasant thoughts and feelings despite undesirable outcomes. Expendng a great deal of effort in an attempt to control anxiety and other negative emotions does not work very well in the long term (Wegner, et al., 1987; Wegner & Zanakos, 1994) and takes time and effort away from moving in meaningful life directions (Eifert & Forsyth, 2005; Gross, 1998; 2002; Gross & John, 2003).

Instead, acceptance in ACT involves actively and consciously embracing thoughts and feelings incurred by one’s history, without needless attempts to alter their form or frequency, especially when doing so would lead to psychological suffering (Eifert & Forsyth, 2005; Hayes et al., 2011). For example, clients experiencing anxiety are taught to feel anxiety just as it is, fully and openly. From this perspective, acceptance provides clients with psychological flexibility (i.e., the ability to be in the present moment more fully with open awareness, and persisting in one’s commitments in the service of valued ends), by changing the way client’s relate to their thoughts and feelings rather than attempting to eliminate them (Ciarrochi, Billich & Godsell, 2010; Forsyth & Eifert, 2008; Hayes, Jacobson, Follette & Dougher, 1994; Luoma, 2007). Within ACT, acceptance is not a goal in and of itself but a way to achieve significant life values (Forsyth & Eifert, 2008; Hayes et al., 1994, 1994; Robb, 2006; Walser & Chariter, 2010). Moreover,
acceptance is not a therapeutic strategy per se, but is a stance from which to provide treatment and from which clients can live meaningfully (Hayes et al., 1994).

ACT is deemed to be an empirically supported treatment, with robust support for its effectiveness with chronic pain and moderate support with depression. ACT is also considered an evidence-based practice on the Substance Abuse Mental Health Administration’s National Registry of Evidence-based Programs and Practices. In general, several published effectiveness studies, meta-analyses, and reviews (e.g., Hayes, Luoma, Bond, Masuda & Lillis 2006; Pull, 2008; Powers, Vörding, & Emmelkamp, 2009; Ruiz, 2010; Sheppard, Forsyth, Hickling & Bianchi, 2010) have shown ACT to be effective in the treatment of a wide-range of clinical concerns, including depression, substance dependence, psychosis, diabetes, epilepsy, and multiple sclerosis. ACT has also been shown to be effective in treating several of the anxiety disorders, including generalized anxiety disorder, panic disorder, obsessive compulsive disorder, post-traumatic stress disorder and social anxiety disorder (Dalrymple & Herbert, 2007; Forman et al., 2007; Twohig, 2006; Twohig 2009a; Twohig, 2009b; Twohig et al., 2005; Twohig et al., 2010). The empirical literature also provides support for the positive effects of ACT mechanisms, including acceptance, defusion, mindfulness, and values, on treatment outcomes in both clinical (e.g., depression, psychosis, anxiety, chronic pain) and nonclinical populations (See Hayes et al., 2006, for a review).

Using acceptance relative to “control” (i.e., suppression, distraction, cognitive restructuring or controlled breathing) as an intervention for addressing anxiety symptoms has also been evaluated in studies incorporating a panicogenic challenge procedure consisting of CO₂-enriched air, which has been shown to induce acute panicogenic
distress (Eifert & Heffner, 2003; Feldner, Zvolensky, Eifert & Spira, 2003; Karekla, Forsyth & Kelly, 2004; Levitt et al., 2004; Spira et al., 2004). Inhalations of CO₂-enriched air have been shown to imitate the physical sensations experienced by an individual during a panic attack (e.g., faster heart rate; chest pain; dizziness; shortness of breath; fears of dying or losing control; (Acheson, Forsyth, Prenoveau, & Bouton, 2007; Forsyth, Eifert & Canna, 2000; Levitt et al., 2004; Zvolensky & Eifert, 2001). Consequently, it has been successfully employed in experiments evaluating the effectiveness of acceptance on coping with anxiety symptoms.

Studies employing this procedure have shown that a greater tendency toward EA (and conversely less acceptance of anxious thoughts and feelings), as measured by the Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004), is associated with higher levels of panic and fear symptoms in healthy individuals (Feldner et al., 2003; Karekla et al., 2004; Spira et al., 2004). Similar results have been found in clinical samples (Levitt et al., 2004) and using behavioral provocations (Campbell-Sills et al. 2003; Cochrane et al., 2007; Sloan, 2004).

Many studies have used instruction alone or brief rationale to evaluate the effectiveness of acceptance. However, in reality, clients have likely already had others tell them or may have tried to convince themselves to accept their fear and anxiety (Eifert & Forsyth, 2005). Additionally, acceptance is about making contact with thoughts and feelings fully and openly as they occur in the moment. Thus, it does not seem that acceptance can be achieved solely through instruction and instead would be most beneficial if it is openly experienced. That is, changing our experience with our environment necessitates permitting ourselves to experience the world directly (Eifert &
Metaphor and other non-literal forms of communication and exercises are designed to facilitate the development of acceptance as an experiential process (Eifert & Forsyth, 2005; Hayes et al. 2011). The following section will describe the use of metaphor in the context of acceptance-and mindfulness-based approaches.

**The Use of Metaphor in Acceptance-Based Approaches.** Perhaps more than other approaches, metaphor is a major component of newer acceptance- and mindfulness-based treatments such as DBT, MBCT and ACT. For instance, the use of metaphor in DBT is a powerful means of teaching dialectical thinking and opening up possibilities for new, more adaptive behaviors. Indeed, Linehan and colleagues (1993) developed a large number of metaphors to discuss parasuicidal behaviors and other behaviors that interfere with therapy, acceptance of thoughts and feelings, and life in general. For example, suicidal behaviors have been likened to a climber jumping off a mountain, with the rope occasionally still attached to the guide, who has to pull the climber up. As another example, learning distress tolerance is likened to “letting leaves fall as they may without fighting them off (Linehan, 1993, p. 210).

Metaphor is also used in MBCT to help clients relate mindfully to their current experience (Segal, Williams & Teasdale, 2002; Stott et al., 2010). Here, metaphor may help depressed clients relate to their symptoms in a more mindful and less judgmental fashion. For example, Teasdale et al. (2000) uses the metaphor of driving a car on a familiar route without realizing that one is actually driving (i.e., driving on autopilot). The goal of using metaphor in therapy is to shift the attentional focus from “autopilot” driving to “mindful” driving.
Metaphor appears to be more central in ACT than in many other psychotherapies and its use is closely tied to the unhelpful properties of literal language. From an ACT perspective, human language abilities are a paradoxical two-edged sword, allowing us to be problem-solvers and to adapt to our world successfully, while simultaneously permitting us to bring our painful histories to the present, to view our thoughts and feelings as problems that need to be solved, to judge ourselves against unrealistic standards, and to envisage fearful futures (Blackledge & Hayes, 2001; Hayes et al., 2011; Luoma et al. 2007; Twohig et al., 2005). From an ACT point of view, human suffering occurs, in part, because of the way language and cognition combined with life circumstances, contribute to an inability to persist or make changes that are consistent with moving in long-term valued directions (Forsyth & Eifert, 2008; Hayes et al., 2011; Varra, Drossel & Hayes, 2009). This type of psychological inflexibility develops when people use certain aspects of language in inflexible ways or in instances when they are not useful (Eifert & Forsyth, 2005; Hayes & Wilson, 1994; Hayes et al., 2006; Luoma et al., 2007). In essence, the problem is that literal language may lead to struggle, control, and avoidance of unpleasant private experiences, which further contributes to psychopathology and human suffering, and thus little movement in valued life directions.

ACT undermines the problematic aspects of language by using less literal forms of communication, including metaphor and other similar processes (e.g., paradox) to change the context in which a person experiences thoughts and feelings (Hayes et al., 2011). Specifically, the use of metaphor within ACT avoids the traps of explicit instruction or verbal rules, thereby allowing for flexible behavior, making it easier to meet the changing demands of a situation, and increasing psychological flexibility in the
service of valued ends (Hayes et al., 2011; Luoma et al., 2007; Varra, Drossel & Hayes, 2009). Within an anxiety context, in particular, metaphor allows clients to experientially make contact with the unworkability of persistently avoiding and controlling anxious thoughts and feelings (Eifert & Forsyth, 2005). Additionally, within ACT, metaphor provides a way to make logical sense out of paradoxical points (Blackledge & Hayes, 2001; Hayes et al., 2011). Many ACT concepts are not necessarily logical even though they make sense from a treatment perspective (i.e., leaning into anxiety rather than avoiding it or struggling for control). Thus, metaphors may facilitate client awareness of the paradoxical nature of many life circumstances (Hayes et al., 2011).

There are several commonly used metaphors within ACT, particularly within an acceptance context. The goal of several of these metaphors is to let clients experience that acceptance of unwanted thoughts and feelings is likely to work better than persistent and excessive control. In order to enhance the effectiveness and salience of ACT-relevant metaphors, clients may act out such metaphors as exercises in psychotherapy. One commonly used metaphor, called the Chinese Finger Trap Metaphor, was developed to help clients discover that attempts to control unwanted thoughts and feelings often just perpetuates the struggle with those thoughts and feelings (Eifert & Heffner, 2003; Hayes et al., 1999). In essence, this metaphor allows clients to experience how doing something that seems paradoxical (leaning into one’s anxiety) may be a better solution than persisting with unworkable control strategies (Eifert & Forsyth, 2005; Eifert & Heffner, 2003). Another commonly used metaphor in ACT is the Tug-of-War with the Anxiety Monster (Hayes et al., 2011). The purpose of this metaphor is to show clients that the effort that goes into fighting or struggling with anxiety has left them stuck, and thus they
are not free to do other things that matter to them. Apart from some of the common metaphors used within ACT, clinicians are encouraged to collaborate with clients to create their own metaphors in order to meet the particular needs of their clients.

Empirical evaluations of metaphor use within ACT. Most research examining the impact of metaphor within the context of acceptance and mindfulness-based treatment approaches has been conducted within an ACT framework. In one study, highly anxiety sensitive females ($N = 60$) were randomized to either an acceptance condition, consisting of a behaviorally enacted ACT metaphor (i.e., the Chinese Finger Trap Metaphor; Hayes et al., 1999) intervention, a “control” condition, consisting of diaphragmatic breathing, or a no-instruction condition before undergoing two separate 10-minute CO$_2$ inhalation trials. Participants in the acceptance condition showed less behavioral avoidance, reported lower levels of fear and anxiety and had less cognitive symptoms (e.g., fewer catastrophic thoughts) relative to the other conditions (Eifert & Heffner, 2003). However, it was unclear in this study whether the acceptance intervention or the additional acting out of a metaphor contributed to positive outcomes.

A number of other studies within the acceptance literature provide some clues as to the impact of delivering an acceptance intervention through metaphor (typically combined with a behavioral exercise) relative to instruction alone. For instance, participants ($N = 84$) were randomized into 3 conditions in which either acceptance instructions were combined with an ACT acceptance exercise and metaphor, acceptance instructions were combined with a traditional CBT exercise (Takahashi, Muto, Tada & Sugiyama, 2002) or a no-instruction condition. Participants in the condition that included acceptance exercises and metaphor but not those in the condition that included CBT
exercises showed positive changes in pain tolerance, suggesting that ACT exercises and metaphor, and not merely acceptance instruction, were necessary to produce the effect (Takahashi et al., 2002).

In another study, which more directly compared metaphor to instruction alone, nonclinical participants (N=97) were randomized to one of 5 conditions: 1) an acceptance based metaphor (i.e., a swamp metaphor) condition combined with a behavioral exercise (i.e., repeating the statement “I cannot walk” while walking around the room), 2) an acceptance instruction only condition, 3) a full distraction condition (e.g., distracting themselves with a pleasant scenario), 4) a distraction instruction only condition and 5) a no instruction condition (McMullen et al., 2008). Participants were then exposed to shocks, in order to assess the effects of the interventions on pain tolerance. Participants in the acceptance metaphor condition showed more pain tolerance than participants in all other conditions, including the acceptance instruction condition (McMullen et al., 2008). Similar results were found in a study evaluating varying degrees of an intervention of a related construct, defusion (i.e., attempts to alter the way individuals relate to thoughts and feelings, rather than altering their form or frequency; Masuda et al., 2010).

Specifically, non-clinical individuals (N = 147) as well as those meeting criteria for major depression (N = 71) were randomized to 1 of 5 conditions: 1) a full-defusion condition containing an experiential exercise (i.e., repeating a negative thought about oneself), 2) a partial-defusion condition (i.e., repeating a neutral word), 3) a full distraction condition, 4) a partial distraction condition and 5) a no instruction condition. Individuals in the full-defusion condition showed reduced emotional distress, and fusion (i.e., buying into the
literal content of thoughts and feelings) with negative thoughts about oneself, than in all other conditions, including the partial-defusion condition (Masuda et al., 2010).

The Present Study

Summary of the Current Literature

To summarize, limited studies have systematically evaluated the clinical impact of metaphor in psychotherapy and have shown it to have several advantages, including increasing the memorability of therapeutic information, and decreasing behavioral avoidance, emotional discomfort, believability, and emotional distress (Donnelly & Dumas, 1997; Heffner, Greco & Eifert, 2003; Martin et al., 1992; Masuda et al., 2010 & McMullen et al., 2008). Additionally, research that explicitly compared an acceptance-based metaphor combined with a behavioral exercise to instruction alone showed that conditions that include metaphor have a more significant positive effect on outcome (McMullen et al., 2008). Although preliminary studies are valuable in showing that conditions that include metaphor and exercises may lead to positive outcomes, there are many limitations to this literature.

For instance, few studies to date have explored the impact of metaphor within an acceptance context in relation to anxiety pathology. Indeed, the studies that have been conducted examining the effects of an acceptance intervention relative to a “control” intervention on anxiety symptomatology (e.g., Campbell-Sills et al., 2006, Levitt et al, 2004; Feldner et al., 2003) have largely used instruction to train their participants, with the one exception being the work of Eifert and Heffner (2003). This is surprising given that metaphor is so commonly used within ACT.
Additionally, no studies have directly examined the effectiveness and impact of metaphor use alone (i.e., not combined with an exercise), and particularly whether metaphor is differentially more or less impactful when delivered behaviorally versus imagined. However, it has been suggested that enacting metaphor behaviorally may enhance the effectiveness of the metaphor, and allow individuals to have a broader range of novel and potentially more adaptive experiences (Burns, 2007; Eifert & Forsyth, 2005; Eifert & Heffner, 2003).

**Aims of the Present Study**

Given the limitations in the extant literature, the present study examined the impact of metaphor within ACT, comparing behaviorally enacted to imaginal delivery of an acceptance-based metaphor. Participants were trained in an acceptance strategy via imaginal or behavioral delivery of metaphor before undergoing two back-to-back 5-minute CO₂ trials, each of which participants were prompted to start on their own (in order to evaluate behavioral willingness as indexed by latency to begin each trial). Heart rate and subjective self-report (i.e., evaluative ratings of thoughts and feelings and frequency and severity of panic symptoms) were assessed at baseline, after 2 CO₂ inhalations and subsequent to a recovery and resting period and compared across groups. Heart rate was used as a measure of physiological arousal and end tidal CO₂ was continuously monitored to ensure the safety of participants and to provide feedback to the experimenter on the response of the participants to the CO₂-enriched air. Participants could leave the study at any time without being penalized, and could choose to participate in an additional challenge, as an index of their willingness to engage in the challenge for a third time. Multiple methods were used in this study for several reasons which included
circumventing some of the problems of using one method alone, providing richer and more credible evidence for particular outcomes, and reducing measurement error.

In order to achieve our aims, an all-female moderate to high anxiety sensitive sample \((N = 98)\) was recruited and pre-screened to ensure study eligibility. Only moderate to high anxiety sensitive females were included for several reasons. First, females are more commonly diagnosed with anxiety disorders, including panic disorder (Cleary, Burns, & Nycz, 1990). Second, the use of a homogenous female sample reduces variability, and thus may contribute to stronger effects. Third, greater anxiety sensitivity (AS) is commonly known to be a risk factor for anxiety/panic symptomatology. Indeed, from the perspective of anxiety sensitivity models (McNally, 1994; 2002; Reiss et al., 1986), particular individuals have an innate tendency to fear anxiety-related symptoms, and thus believe that these symptoms may have harmful effects on their mental, social, and physical well-being (Bouton, Mineka & Barlow, 2001).

Several studies have provided evidence for the role of AS as a risk factor for the development of anxiety/panic symptoms (e.g., Barlow, 2002; Eke & McNally, 1996; Feldner et al., 2003; Karekla et al., 2004; Maller & Reiss, 1992; Reiss et al., 1986; Schmidt, Zvolensky & Maner, 2006; Schmidt, 1999; Schmidt, Lerew & Jackson, 1997). More specifically, AS has been demonstrated to be a predictor of strong panic response during CO2-enriched air and other biological challenge procedures (Feldner et al., 2003; Karekla et al., 2004; Maller & Reiss, 1992; Reiss et al., 1986; Schmidt et al., 2006). Thus, the use of a moderate to high AS sample in the present study was expected to enhance the probability that the CO2-enriched air had a robust effect and increase the propensity to use the learned strategy.
Clinical Impact of the Present Study

This research is expected to significantly contribute to the effective delivery of ACT treatment as well as other treatment approaches. It may also result in more effective use of metaphor in psychotherapies, and the generation of new methods by which metaphors can be delivered. Additionally, learning about something by doing it may make a therapeutic message more relevant or salient for clients. For instance, behaviorally enacting an ACT-based metaphor allows clients to physically and directly learn the effects of their actions (e.g., how much physical energy and focus it takes to engage in an unworkable control agenda). Indeed, from an ACT perspective, acting out a metaphor may allow clients to look at their actions rather than what their mind says about their actions, and thus the problematic aspects of language may be even less likely to interfere with positive therapeutic outcomes.

Study Hypotheses

This study aimed to test the following hypotheses:

*Hypothesis 1: The behavioral delivery of metaphor was expected to result in significantly less subjective distress, struggle, control, avoidance and fusion and greater acceptance than the imaginal delivery of metaphor. This hypothesis is somewhat tentative, but derived from accounts suggesting that enacting a metaphor may lead to better outcomes than just imagining it (Eifert & Forsyth, 2005; Eifert & Heffner, 2003). The behavioral delivery of metaphor group was also expected to endorse less self-reported panic symptoms than the imaginal group.*

*Hypothesis 2: Based on other biological challenge studies in the literature which have not shown many differences in physiological response (i.e., heart rate, skin*
conductance) between groups, possibly due to ceiling effects (c.f., Eifert & Heffner, 2003; Levitt et al., 2004; see Zvolensky & Eifert, 2001 for a review and explanation), heart rate response during the inhalations was not expected to vary by condition. However, it was expected that during the post-challenge recovery period, the imaginal delivery group would have slower rates of heart rate recovery than the behaviorally enacted delivery group. These hypotheses are somewhat speculative, but consistent with previous work.

**Hypothesis 3:** Participants in the behavioral delivery of metaphor group were expected to be less behaviorally avoidant than participants in the imaginal delivery of metaphor group, as evidenced by lower dropout rates, faster latency to start the CO₂ trials, and more willingness to participate in a third biological challenge procedure.

**Hypothesis 4:** Participants in the behavioral metaphor group were expected to find the intervention more useful overall, meaningful and impactful, and to report being more willing to use it again outside of the research setting than individuals in the imaginal metaphor group.

**Methods**

**Participants**

A total of 224 female undergraduates were recruited from the University at Albany, State University of New York psychology research pool and general student population at the University at Albany. One hundred and thirteen of these individuals were excluded because they did not meet criteria (see below) and thirteen individuals were scheduled but did not show-up for the experiment. Thus, a total of 98 participants with a mean age of 20.29 (SD = 3.31) were included in the experiment with 91 completers and 7 drop-outs. A power analysis, using G*power statistical analysis
software (Faul et al., 2009), indicated that approximately this number of participants allowed for a power of approximately .80 to detect medium size effects (i.e., partial eta squared of .060 or higher, Cohen; 1988). Participants received either course credit or twenty dollars as compensation for their participation. A diverse population of participants made up the present sample, which included Caucasian (47.9%), African American (22.9%), Asian (8.3%), Latino (10.4%), and other ethnicity (e.g., mixed and south asian; 7.3%) participants.

Participants were screened for inclusion by administering the Anxiety Sensitivity Index (ASI). Those who had scores within one standard deviation of the mean for panic disorder (i.e., a score of 16 or higher; Gardenswartz & Craske, 2001; Peterson & Reiss, 1993) were included in the study. All potential participants were also pre-screened for medical and psychiatric conditions using a modified brief version of the Anxiety Disorders Interview Schedule-IV (Brown, DiNardo, & Barlow, 1994; See Appendix A). Individuals were excluded if they reported any of the following conditions: (a) cardiac or pulmonary disease, (b) asthma, (c) epilepsy, (d) hypertension, (e) stroke, (f) migraine headaches, (g) HIV/AIDS, (h) renal disease, or (i) the possibility of being pregnant. These exclusionary criteria guaranteed the safety of any individuals who had medical conditions that could have been exacerbated by the biological challenge procedure (Acheson et al., 2007; Eifert & Heffner, 2003; Forsyth & Eifert, 1998; Karekla et al., 2004). Moreover, individuals were excluded if they endorsed diagnostic criteria for panic disorder, PTSD, any psychotic symptoms, substance dependence, suicidality or claustraphobic fears, or if taking psychotropic medications or receiving psychological
treatment. Moderate to high anxiety sensitive females who did not meet exclusionary
criteria were randomly assigned to one of two experimental conditions (see Appendix C).

**Materials and Apparatus**

**Pre-experimental self-report measures.** Participants completed a series of well-
validated and commonly used anxiety-related measures, ACT process measures (i.e.,
experiential avoidance and cognitive fusion) and a social desirability scale via Qualtrics
Survey Research Suite (Qualtrics Labs, Inc., 2009) prior to the experiment to ensure no
differences between conditions at baseline (See Appendix B for all self-report measures).
The following measures were included:

*The Anxiety Sensitivity Index.* (ASI; Peterson & Reiss, 1993; Reiss et al., 1986) is
a 16-item questionnaire designed to assess fear of anxiety-related symptoms. Each item is
rated on a 5-point Likert scale (0 = *very little* to 4 = *very much*). The ASI has a high
degree of internal consistency (α = .82 to .91; Peterson & Reiss, 1993) and stable test-
retest reliability over a three-year period (r = .71; Maller & Reiss, 1992). Several studies
have also found anxiety sensitivity as measured by the ASI to be a strong predictor of
anxiety symptoms in CO₂ biological challenge procedures (Holloway & McNally, 1987;
Eke & McNally, 1996; McNally, 2002; Rapee, Brown, Antony & Barlow, 1992;
Schmidt, 1999).

*The Claustrophobia Questionnaire.* (CQ; Radomsky, Rachman, Thordarson,
McIsaac & Teachman, 2001), is a 24-item questionnaire that measures fears of enclosed
places and suffocation. Respondents rate on a 5-point Likert scale (1 = *not at all anxious*
to 5 = *extremely anxious*) how they would feel in situations such as “swimming while
wearing a nose plug”. The internal consistency of the CQ is excellent (alpha coefficients
= .95; Randomsky et al., 2001) and the measure has been found to be an accurate predictor of fearful responding in claustrophobic situations.

The State-Trait Inventory for Cognitive and Somatic Anxiety. (STICSA; Gros Antony, Simms & McCabe, 2007) is a 21-item measure of cognitive and somatic symptoms of anxiety as they pertain to one's mood in the moment (state) and in general (trait). Each scale consists of 21 items that are rated on a 4-point Likert scale (1 = Not at All to 4 = Very Much So). Both the STICSA State and Trait scales include two factors. One factor reflects the cognitive symptoms of anxiety (10 items), and the second factor reflects the somatic symptoms of anxiety (11 items). The STICSA State measure (α = .88) and the STICSA Trait measure (α = .87) have both been found to demonstrate excellent internal consistency in nonclinical and highly anxious clinical samples (Gros et al., 2007). The STICSA was also found to demonstrate high convergent validity with other measures of anxiety and discriminant validity with measures of distinct psychopathological processes, including depression. Additionally, the STICSA has been shown to discriminate between clinical and nonclinical samples (Gros et al., 2007).

The Acceptance and Action Questionnaire-II. (AAQ-II; Bond et al., 2011) is a 7-item measure that examines the tendency toward psychological flexibility. Using a 7-point Likert scale (1 = never true to 7 = always true), respondents are asked to rate the degree to which each statement is true of them. Lower scores on the AAQ-II represent greater predispositions toward emotional avoidance and inaction, whereas higher scores represent greater levels of emotional acceptance and psychological flexibility. The AAQ-II demonstrates high internal consistency (mean α = .84), and 3- and 12-month test-retest reliability (r= .81 and .79, respectively). The AAQ-II also demonstrates appropriate
discriminant validity and predicts a range of outcomes, including depression, anxiety, stress, work absence rates and overall psychological distress.

**The Believability of Anxious Feelings and Thoughts Questionnaire.** (BAFT; Herzberg et al., 2012) is a 16-item self-report measure of cognitive fusion or the tendency to buy into or believe anxious thoughts and feelings as if they were literally true. Rather than assessing the presence, intensity, or degree of fear symptoms, the BAFT requires participants to indicate how valid or believable each statement is to them on a 7-point Likert scale (1 = *not at all believable* to 7 = *completely believable*). The BAFT total score is derived by summing responses for all items, with no reverse scoring. Higher scores on the BAFT indicate a greater tendency towards cognitive fusion. The total BAFT score shows high excellent internal consistency in both healthy undergraduate (α = .90) and high anxious community (α = .91) samples. Additionally, the BAFT consistently shows strong construct validity with other relevant process and outcome measures, strong 12-week test-retest reliability (r = .77) in a highly anxious wait-list control subsample and responsiveness to treatment in a highly anxious intervention subsample.

**The Anxiety Control Questionnaire.** (ACQ; Brown, White, Forsyth, & Barlow, 2004) is a 15-item self-report measure that assesses perceptions of control over emotional distress and perceived external threats. Respondents rate the extent to which they agree or disagree with each statement on a 6-point Likert scale (0 = *strongly disagree* to 5 = *strongly agree*). The total score is calculated by summing all items and higher scores reflect higher levels of perceived control. The ACQ has an adequate internal consistency score for all scales in clinical and nonclinical samples for each of its three factors.
(emotion control, threat control, and stress control; r ranges from .65 to .74; Brown et al., 2004). The scale reliability of the higher-order structure dimension of perceived control (estimate of .85) suggests that a total ACQ score may also be successfully used as an indicator of perceived control.

**Marlowe-Crowne Scale-13 item.** (MCS; Reynolds, 1982) is a widely used 13-item (short form) measure of the tendency to respond to test content in a socially desirable manner. Participants responded “true” or “false” to each statement and their total score reflects the number of items they endorsed in the “virtuous” direction (e.g., responding false to “I sometimes feel resentful when I don’t get my way”). Several studies have shown that internal consistency is adequate for this scale (Reynolds, 1982; α ranges from .73 - .79) and test-retest reliability has been found to be high (r = .86) over a month period (Reynolds, 1982). Additionally, this scale has low correlations with a number of psychopathology scales (Crowne & Marlowe, 1960). The Marlowe-Crowne Social Desirability Scale was administered in response to possible demand characteristics of the experimental procedures and to ensure the honesty of participants.

**Experimental Self-Report Measures.** Following a video which showed the experimenter teaching strategies to be used during the challenge (see Appendix C for scripts; metaphor scripts are adapted from Eifert & Heffner, 2003 and Forsyth & Eifert, 2008), participants completed a manipulation check questionnaire that was adapted from Levitt et al. (2004), consisting of multiple-choice questions. These questions evaluated participants’ understanding of the interventions presented in the videos (and behaviorally enacted in the behavioral condition), participants’ expected usefulness of these interventions during the challenge, and how often they use the approach that they have
learned in everyday life. Participants were also asked whether they are familiar with the finger trap (i.e., to assess whether differential familiarity with it may have contributed to differences between groups). These manipulation checks were used to determine participants understanding and familiarity with the learned approaches. Without a full understanding of how to use the strategy that they learned during the CO$_2$-enriched air inhalations, it would have been unclear whether or not that they were implementing that particular strategy. The video was watched by participants no more than two times and if they failed the manipulation check both times, they were released from the study.

Participants completed eight paper-and-pencil visual analogue evaluative rating scales (VAS scales) similar to those developed by Wolpe (1958). The first five of these scales measured subjective distress (0 mm = *not at all distressed* to 100 mm = *extremely distressed*), urge to escape (0 mm = *no urge* to 100 mm = *strong urge*), intensity of bodily reactions (0 mm = *not at all intense* to 100 mm = *extremely intense*), control over bodily reactions (0 mm = *absolutely no control* to 100 mm = *total control*), and fearfulness (0 mm = *not at all fearful* to 100 mm = *extremely fearful*). These scales have been used in prior CO$_2$ biological challenge studies (e.g., Acheson et al., 2007; Karekla et al., 2004; Kelly et al., 2006; Kelly & Forsyth, 2007; Prenoveau, Forsyth, Kelly & Barrios, 2006). Because all individuals were presented with an ACT-based protocol, ACT relevant processes including acceptance (0 mm = *not at all accepting* to 100 mm = *extremely accepting*), struggle (0 mm = *no struggle* to 100 mm = *extreme struggle*) and fusion (0 mm = *no fusion* to 100 mm = *extreme fusion*) were also included. Participants completed these scales at pre-baseline, at the five minute mark of each inhalation trial, during the recovery period and during a resting period.
The Diagnostic Symptoms Questionnaire. (DSQ; Sanderson, Rapee & Barlow, 1988) is a 16-item self-report measure of the frequency and severity of DSM-IV panic symptoms (American Psychiatric Association, 1994), including somatic, cognitive and fear symptoms. The total frequency of symptoms is rated by averaging across the 16 symptom items. The severity of each symptom is rated on a 9-point Likert scale (0 = not at all felt to 8 = very strongly felt) and averaged across the 16 symptoms for a total severity score. The DSQ is commonly used in CO₂ biological challenge research (Forsyth, Eifert & Thompson, 1996; Forsyth & Eifert, 1998; Kelly et al., 2006). The DSQ also provides more detailed information on the number and severity of physical and cognitive panic symptoms. (Sanderson et al., 1988). DSQ responses were assessed immediately following each CO₂ inhalation trial and the recovery period.

Participants completed an additional manipulation check measure at the end of the experiment (adapted from Levitt et al., 2004) to determine what strategies were used during the CO₂-enriched air provocations (See Appendix D), including the learned strategy. The manipulation check also assessed whether participants considered the learned intervention to be useful, impactful/meaningful, and likely to be used again in the future.

Videos. Participants watched videos instructing them on strategies to be used during the CO₂-enriched air challenges and during recovery, which involved either imaginal delivery of an acceptance-based metaphor or behavioral enactment of that metaphor (see Appendix C for scripts). Each video was seven and a half minutes in duration and the wording and structure of the messages for each condition were similar.
In the imaginal metaphor condition, participants learned an acceptance message geared toward their endorsed concerns using a verbal metaphor without any experiential demonstration or practice, namely the Chinese Finger Trap Metaphor (Eifert & Heffner, 2003; Hayes et al. 1999). Participants were asked to imagine a Chinese finger trap, which is a tube of woven straw about 5 inches long and half an inch wide. Participants were told that the finger trap works by sliding both index fingers into a straw tube, one finger at each end. If they attempt to pull the fingers out, the tube catches and tightens, which causes discomfort. The only way to regain some freedom and space to move is to push the fingers in first and then slide them out. This metaphor allows participants to imagine that trying to minimize and control anxiety symptoms that are, in essence, uncontrollable, while reasonable and understandable (like pulling out of the finger trap), only creates greater tension and perpetuates the struggle with anxiety. The harder one tries to pull their fingers out of the trap, the more it tightens, leading to further discomfort and pain. In contrast, doing something counterintuitive by pushing the fingers in instead of pulling them out (and similarly leaning into anxiety symptoms) will likely result in an end to one’s struggle with anxiety and allow more freedom to move in important life directions (Eifert & Heffner, 2003; Eifert & Forsyth, 2005; Hayes et al., 1999).

In the experiential metaphor condition, the Chinese finger trap metaphor was presented verbally and was also modeled for participants via video. Additionally, participants were given the opportunity to experience it with an actual finger trap, in order to increase the credibility and usefulness of the metaphor and to let participant’s discover experientially that pulling out of the trap does not work. Struggling to release from the trap makes it tighten further just as struggling with uncontrollable panic
symptoms and their own endorsed concerns, creates more tension and perpetuates their struggle (Eifert & Heffner, 2003; Eifert & Forsyth, 2005).

In order to increase the relevance and potency of the intervention for participants, each script was written so that participants would receive an acceptance message that could be applied to various unpleasant thoughts, physical sensations and social situations linked to anxiety sensitivity.

**Panicogenic Stimulus.** The panicogenic stimulus was comprised of two 5-minute inhalations of 10% carbon dioxide-enriched air (10% CO\textsubscript{2}, 31% O\textsubscript{2}, 59% N\textsubscript{2}). This 10% concentration is considered a relatively low concentration of CO\textsubscript{2} enriched air, which produces its panicogenic effects gradually rather than abruptly (Eifert & Heffner, 2003; Zvolensky & Eifert, 2001). Lower concentrations of CO\textsubscript{2}-enriched air are more appropriate than higher concentrations when the experimental design requires that participants experience panic-like symptoms for several minutes instead of seconds in order to have the opportunity to apply the learned strategy during a moderately distressing biological challenge procedure (Eifert & Heffner, 2003; Levitt et al., 2004). Lower concentrations of CO\textsubscript{2} -enriched air are also more consistent with the progression that usually occurs in panic attacks where symptoms reach their peak within a period of a few minutes (for a detailed review of CO\textsubscript{2} challenge procedures, see Zvolensky & Eifert, 2001). Lastly, the 10% concentration of CO\textsubscript{2}–enriched air has been shown to produce significant panic symptoms in individuals with panic disorder, with anxiety sensitivity as a significant predictor of such symptoms (Rapee et al., 1992).

Participants received inhalations of CO\textsubscript{2}-enriched air through a continuous positive air pressure Hans Rudolph® mouth-breathing-only respiratory mask with head
strap. The respiratory mask was attached to 1.8m of 22mm aerosol tubing that was connected to a single free port of Pneumatic 3-way Sliding Type directional control valve (Hans Rudolph, Inc, 6000 Series). The tubing is linked to a 60-l non-diffusing gas collection bag through a valve port using a large 35 mm with a flexible O-ring attached. The bag was inflated with a CO₂ mixture supplied from an adjacent tank using a .25 inch stem and Tygon tubing. One free port was left unattached to allow normal room air into the bag from the laboratory environment. Participants breathed both normal room air and CO₂ -enriched air directly from the bag to reduce any detection in air pressure fluctuations in the mask. The directional control valve was activated by a 4285 Series automated controller (Hans Rudolph, Inc.), which permitted accurate switching between normal room air and CO₂ -enriched air and was initiated by quickly pressing a button. This allowed for uninterrupted breathing of the CO₂, precise switching back and forth between the CO₂ and normal room air, and prevented a combination of the 2 (see Lejuez, Forsyth & Eifert, 1998). The CO₂ delivery apparatus was located in a sound-attenuated room adjoining the room where participants were situated.

**Heart Rate Response.** Heart rate in beats per minute (with average heart rate computed in 8 second epochs), was sampled using a Novametrix CO₂/SMO Capnograph interfaced with a Coulbourn V-Series Modular Polygraph, and digitally recorded to a computer using a NOVACOM1 card. Expired levels of CO₂ (ETCO₂), and oxygen saturation (SPO₂) in the blood, were also sampled and monitored throughout the experiment to ensure participant safety.
Procedure

Participants first completed a consent form (Appendix E) describing the experimental procedure and a standardized battery of pre experimental questionnaires (Appendix B). Then, participants were randomized to one of two acceptance conditions: 1) imaginal delivery of metaphor, or 2) behaviorally enacted delivery of metaphor.

Subsequently, participants were seated in a recliner chair in a low-lit, sound-attenuated experimental room (3m X 1.5m). After being seated, a respiratory mask with a head strap and a nose clip were fitted onto each participant in order to decrease olfactory detection of the CO₂ and to maximize ventilation (cf. Forsyth & Eifert, 1998). Participants were also fitted with a pulse oximeter to measure heart rate and monitor oxygen saturation in the blood.

Participants listened to a detailed outline of the procedure, which included an explanation of the potential temporary side effects of breathing CO₂-enriched air (e.g., faster heart rate, shortness of breath, feelings of suffocation and anxiety and panic symptoms). The instructions enabled several functions which included informing participants to the fullest extent of possible uncomfortable effects and minimizing expectancy effects (cf. Forsyth et al., 1996; Forsyth & Eifert, 1998b). Additionally, in order to reduce predictability, participants were not told about the amount or the duration of the CO₂ (Karekla et al., 2004).

Participants were asked to sit and relax for a five-minute baseline period, while heart rate was recorded. Subsequently, participants learned that they would be watching a video (engaging in an exercise) teaching them an intervention that might be beneficial in dealing with symptoms experienced while breathing the CO₂-enriched air. Participants
were advised to pay attention carefully because they would be given a brief quiz about the video. Participants then watched a video (and acted out the intervention in the behavioral condition) showing one of the acceptance strategies, either imaginal \((n = 46)\), or behaviorally enacted metaphor \((n = 45)\), on a computer positioned on a desk in front of them. After participants learned the strategy, they completed a manipulation check questionnaire assessing their understanding of the strategy and its expected usefulness as well as familiarity indices. Participants were then prompted to start the first CO\(_2\)– enriched air trial by clicking a start-trial icon that appeared on a computer screen using a serial response box (via e-prime presentation software). The computer recorded the latency between the appearance of this screen and the click of the button but participants did not actually start the CO\(_2\)–enriched air trial themselves, which would have been difficult to feasibly do given program and equipment constraints. Thus, once the experimenter saw the participant click the button, the first 5-minute 10\% CO\(_2\) trial was started immediately.

Subsequent to the first trial, participants were prompted immediately by the computer to click the serial box button to start the second trial when ready and again latency between the appearance of the screen and when participants’ started the second trial was recorded onto the computer. However, the biological challenge procedure did not actually begin right away. Participants were first asked to complete the DSQ to report on panic symptoms experienced during the first trial as well as to complete the VAS scales. Then the experimenter re-entered the experimental room briefly to review the acceptance metaphor interventions using a script.
Following the reminder, a second 5-min CO₂ inhalation trial began. Subsequent to the second trial, participants completed another DSQ and the VAS scales as before. Participants then underwent a 5-minute post-challenge recovery period during which they were asked to continue to use the learned strategy while breathing normal room air. Following this first post-challenge recovery period, participants completed another DSQ, more VAS scales, and then were invited to participate in a third CO₂ inhalation trial. Specifically, participants were asked three questions assessing their willingness, the order of which was randomly counterbalanced across participants: (1) Would you be willing to do what we just did again right now?, (2) How willing would you be? and (3) Would you be willing to undergo this procedure again with a more intense version of the CO₂ (See Appendix D)? They were informed that they would receive the same compensation and would remain in the chair for the same amount of time whether they participated or not. Those who agreed to the 3rd challenge were told that the collection of more data was actually not necessary and we no longer needed their participation.

Participants then began a second 5-minute recovery period, followed by a 5-minute resting period in which heart rate was measured and a final set of evaluative rating scales were completed. The addition of another recovery period before more measures were obtained enabled participants who may have felt anxious about participating in a third CO₂ challenge to return to baseline levels. Participants were also given a final manipulation check measure to assess whether they used the strategy that they learned and if not, what strategies that they used throughout the experiment. They were also asked how useful overall and meaningful the strategy they learned was, and whether they would use that strategy again in the future. At the end of the experiment, the
respiratory mask, nose clip and pulse oximeter were removed, and participants were debriefed and compensated.

**Data Analyses**

**Random Assignment**

To establish whether the imaginal and behavioral conditions were equal at baseline due to random assignment, t-tests and $X^2$ tests were conducted to examine group equivalence in terms of age, race, year in college, pre-experimental questionnaires, baseline heart rate and VAS evaluative ratings. Differences between research pool and paid participants were also examined using independent samples t-tests.

**Manipulation Checks**

The groups were compared on their responses to each of the two quiz items used to determine participants understanding of the intervention using $X^2$ analyses. The expected usefulness of the strategy, how often they used the strategy in everyday life and how familiar they were with the finger trap were explored using an independent samples t-test. Independent samples t-tests were also conducted to compare the groups in terms of strategies employed during the biological challenge and the usefulness of each strategy. Lastly, groups were compared with respect to how useful overall, as well as how meaningful and impactful they thought the strategy that they learned was using an independent samples t-test.

**Outcomes**

For all self-report, behavioral and heart rate data, transformations were applied to correct for skewness and kurtosis when necessary to normalize the data, and outliers were identified and screened out. Analyses only included data from participants who
completed the study with the exception of drop-out rates. Additionally, Greenhouse-Geisser Degrees of Freedom Adjustments were conducted to correct for violations of sphericity that commonly occur in repeated-measures ANOVA analyses.

**Experimental self-report indices.** VAS evaluative rating scale scores and DSQ (i.e., panic symptom frequency and severity) scores were used to evaluate self-reported differences between groups. VAS scale responses were scored in millimeters by hand using a metric ruler. For VAS scales, data were analyzed using repeated-measures ANOVAs, testing for a main effect of trial across 4 time points (i.e., pre-baseline, 1\textsuperscript{st} CO2, 2\textsuperscript{nd} CO2 and recovery), a main effect of condition (i.e., behavioral and imaginal) as well as the interaction between trial and condition. These analyses allowed for the examination of changes in self-report scores from baseline to CO\textsubscript{2} and recovery trials, changes from the CO\textsubscript{2} to recovery trial and trial x condition interaction effects. Significant ANOVAs were followed up by single degree of freedom contrasts to further clarify the nature of the results.

Panic symptoms were averaged across 16 DSQ panic symptoms to obtain a total score. Two separate, repeated-measures ANOVAs were conducted over 3 trials (i.e., 1\textsuperscript{st} CO\textsubscript{2}, 2\textsuperscript{nd} CO\textsubscript{2} and recovery), assessing for differences in frequency and severity of symptoms across conditions. Separate repeated-measures ANOVAs were also conducted for physical and cognitive symptoms separately. Significant ANOVAs were followed up by single degree of freedom contrasts.

**Behavioral indices.** A t-test was conducted on latency to begin the CO\textsubscript{2} trials. \(X^2\) analyses were conducted to analyze dropout rates and willingness to engage in a 3\textsuperscript{rd} biological challenge. Furthermore, t-tests were used to examine how willing participants
were to participate in a 3rd biological challenge and how willing they were to participate in a more intense version of the CO\(_2\).

**Heart rate indices.** Heart rate was averaged across 8 second intervals over 4 separate 5-minute time periods. As with VAS evaluative ratings, a repeated-measures ANOVA was conducted on heart rate across 4 time points (i.e., pre-baseline, 1st CO\(_2\), 2nd CO\(_2\) and recovery) to test for significant main effects of both trial and condition and a significant trial x condition interaction. Contrasts were used to follow-up on the nature of significant effects.

**Effect Size**

Partial eta squared was used as an index of effect size to provide an estimate of the magnitude of group differences on scores across self-report, behavioral and heart rate indices. Consistent with Cohen (1988), 0.01 is considered a small effect, 0.06 a medium effect and 0.13 is considered a large effect.

**Results**

**Random Assignment**

All data was analyzed based on the 91 completers in the experiment. \(X^2\) analyses and independent samples t-tests showed no group differences in terms of demographic variables (i.e., age, race, year in college; Table 1), pre-experimental questionnaire scores (see Table 2), baseline heart rate levels (see Table 6), initial evaluative ratings (see Table 6) and resting period VAS scores and heart rate. These results indicate that random assignment was successful in producing equivalence across groups on assessed demographic domains and pre-experimental scores as well as post-experimental resting period scores.
Independent samples t-tests also showed no group differences on any baseline measures between participants recruited for course credit (n = 76) and for payment (n = 15), suggesting that participants who received course credit were equivalent to those who received payment (see Table 3).

**Manipulation Checks**

**Quiz on the delivery of the intervention.** $X^2$ analyses were performed to evaluate differences between groups on answers to quiz items. No group differences were found with respect to understanding the intervention. Taken together, 8% of participants watched the video twice with no group differences, and no participants failed the quiz items twice.

**Expectancy.** An independent samples t-test was performed to evaluate differences between groups on expected usefulness of the intervention before the upcoming breathing task on a 5-point scale (1 = *Not at all useful* to 5 = *Extremely useful*). There were no significant differences between groups, $t(45) = -.820, p > .05$. On average, both the imaginal and behavioral groups reported expected usefulness that fell between “somewhat useful” and “very useful” (see Table 4 for means and ranges).

**Everyday use of strategy.** An independent samples t-test was also conducted to evaluate whether groups differed in terms of how often they use the strategies they were taught in their everyday lives on a 4-point scale (1 = *Not at all* to 4 = *Very often*). There were no significant differences, $t(45) = -.679, p > .05$, demonstrating equivalent everyday use of the acceptance strategy between groups. Both groups reported using the strategy “sometimes” (see Table 4 for means and ranges) on average.

**Familiarity with the finger trap.** An independent samples t-test was also conducted to evaluate differences between groups on the extent to which they are familiar
with the finger trap on a 3-point scale (1 = Not familiar at all to 3 = Very familiar). There were no significant differences, $t(45) = 1.91, p > .05$, showing that the groups were equivalent with respect to how familiar they were with the finger trap. On average, familiarity of the finger trap within both groups fell between “somewhat familiar” and “very familiar” (see Table 4 for means and ranges).

**Video engagement.** An independent samples t-test was also conducted to examine how engaging the video was across groups on a 5-point scale (1 = Not at all to 5 = Extremely). No significant differences were found between groups with respect to how engaging the video was, $t(45) = -1.69, p > .05$. On average, engagement with the video fell between “somewhat” and “very engaging (see Table 4 for means and ranges).” As can be seen in Table 4, there is a restriction of range such that all participants found the video at least a little bit engaging.

**Use of strategies during the challenge.** Independent samples t-tests were conducted to compare groups with respect to use of various acceptance, suppression and control strategies as well as usefulness of each type of strategy used during the biological challenge procedures (see Figure 1). No significant differences were found between the imaginal group (60%) and the behavioral group (64%) with respect to percentage of time that acceptance was used across groups, $t(45) = -1.25, p > .05$. There was a significant difference across groups as a whole between strategies used, $F(1, 89) = 45.75, p < .001$. Contrasts revealed that on average, acceptance strategies were used a greater percentage of the time (62%) than suppression strategies (40%), $t(45) = 6.08, p < .001$ and control strategies (36%), $t(45) = 10.52, p < .001$. 


The imaginal and behavioral groups were compared using t-tests on perceived usefulness of strategies that they actually used for coping with anxiety during the CO₂ breathing exercise. There were no differences between groups with respect to usefulness ratings of specific acceptance items nor suppression or control strategies, $p > .05$. Overall, groups rated acceptance strategies as more useful than suppression or control strategies, $F(2, 89) = 32.92, p < .001$.

**Perceived Usefulness, Impact and Willingness to Use Strategy in the Future**

It was hypothesized that overall usefulness, meaning/impact of the strategy and willingness to use the strategy in the future would be higher for the behavioral delivery of metaphor condition than for the imaginal delivery of metaphor condition. Despite the lack of group differences on expectancy of usefulness and on specific emotion regulation strategy items (i.e., specific acceptance, suppression and control strategies), when asked about how useful the finger trap metaphor was overall during the CO₂-enriched air procedures, the behavioral group found the metaphor to be more useful than the imaginal group, $t(45) = -2.75, p < .001$ (see Table 5 for means and ranges). On an 8-point scale (1 = *not at all* to 8 = *extremely*), the behavioral metaphor group rated the usefulness of the intervention as “very” whereas the imaginal group rated it as “moderately.” There was also a significant difference between groups with respect to how likely they would be to use the strategy in the future, $t(45)=-2.75, p < .001$ (see Table 5 for means and ranges). More specifically, on an 8-point scale (1 = *never* to 8 = *all of the time*), the behavioral group on average rated the likelihood of future strategy use as “most of the time” while the imaginal group rated likelihood of strategy use as “frequently”. However, the groups did not differ with respect to how meaningful/impactful they reported the strategies to be,
On an 8-point scale (1 = not at all to 8 = extremely), on average participants rated meaning/impact between “moderate” and “very” across groups. As can be seen in Table 5; however, there is a restriction of range such that no participants rated the meaning/impact of the metaphor intervention as “not at all.”

Subjective (Self-Report) Analyses

Evaluative ratings. The behavioral group was expected to show more positive outcomes on all 8 of the VAS evaluative ratings than the imaginal group. Repeated measure ANOVAs were performed on the eight VAS evaluative rating scales with repeated measures consisting of 4 trials, including pre-baseline, 2 CO2 trials and recovery in order to test for a significant trial by condition interaction. Mean VAS ratings across conditions during baseline, CO2 inhalations, and recovery phases can be seen in Table 6. The results showed there to be significant main effects of trial with scores higher during the 1st and 2nd CO2 trials than during baseline and recovery across all 8 VAS scales.

Additionally, there were main effects for condition as well as trial x condition interactions for 5 out of the 8 evaluative rating scales:

VAS evaluative rating scale 1. There was a significant main effect of condition with respect to how distressed participants reported feeling, F(3, 87) = 5.23, p < .05, \( \eta_p^2 = .055 \). There was also a significant trial x condition interaction, F(3, 87) = 3.49, p < .05, \( \eta_p^2 = .038 \). ANOVA contrasts revealed no differences between groups during baseline, 1st CO2 trial or during recovery but a significant difference between groups during the 2nd CO2 trial, F(1, 89) = 11.77, p < .001, \( \eta_p^2 = .115 \), such that participants in the behavioral metaphor condition showed less distress than in the imaginal metaphor condition (see Table 6).
VAS evaluative rating scale 3. There was a significant main effect of condition with respect to how upsetting participants reported their thoughts were, \( F(3, 87) = 6.67, p < .01, \eta^2_p = .070 \). There was also a significant trial x condition interaction, \( F(3, 87) = 8.31, p < .01, \eta^2_p = .070 \). ANOVA contrasts revealed no significant differences between groups during the 1st CO\(_2\) trial but a significant difference between groups during the 2nd CO\(_2\) trial, \( F(1,89) = 15.75, p < .001, \eta^2_p = .370 \), such that participants in the condition in which metaphor was acted out behaviorally endorsed less upsetting thoughts than participants in the imaginal condition (see Table 6). Participants in the behavioral condition also had lower scores during the recovery period than participants in the imaginal condition, \( F(1,89) = 8.85, p < .01, \eta^2_p = .088 \), relative to baseline (both recovery scores are lower than baseline scores but behavioral change score = 6.58 and imaginal change score = 2.96). However, participants in the imaginal condition appeared to recover more drastically from the 2nd CO\(_2\) trial to recovery (behavioral change score = 16.26 and imaginal change score = 32.33).

VAS evaluative rating scale 4. There was a significant main effect of condition with respect to fear/anxiety scores, \( F(3, 87) = 5.55, p < .01, \eta^2_p = .059 \). There was also a significant trial x condition interaction, \( F(3, 87) = 4.12, p < .01, \eta^2_p = .044 \). ANOVA contrasts revealed no differences between groups during the 1st CO\(_2\) trial or recovery but a significant difference between groups during the 2nd CO\(_2\) trial, \( F(1,89) = 15.75, p < .001, \eta^2_p = .118 \), such that participants in the behavioral delivery of metaphor condition endorsed less fear and anxiety than individuals in the imaginal delivery of metaphor condition (see Table 6).
**VAS evaluative rating scale 5.** There was also a significant condition main effect with respect to how strongly participants endorsed an urge to escape, $F(3, 87) = 6.80, p < .01, \eta_p^2 = .071$, and a significant trial x condition interaction, $F(3, 87) = 3.05, p < .05, \eta_p^2 = .034$. ANOVA contrasts revealed no differences between groups during the 1st CO2 trial or during recovery but a significant difference between groups during the 2nd CO2 trial, $F(1,89) = 13.53, p < .001., \eta_p^2 = .129$, such that participants in the behavioral metaphor condition showed less of an urge to escape the situation than those in the imaginal metaphor condition (see Table 6).

**VAS evaluative rating scale 7.** There was a significant main effect for condition with respect to reported acceptance of thoughts, feelings and physical sensations, $F(3, 87) = 7.00, p < .05, \eta_p^2 = .073$. There was also a significant trial x condition interaction, $F(3, 87) = 2.76, p < .05, \eta_p^2 = .028$. Contrasts revealed no differences between groups during the 1st CO2 trial but a significant difference between groups during the 2nd CO2 trial, $F(1,89) = 9.46, p < .001, \eta_p^2 = .094$, such that the behavioral delivery of metaphor contributed to greater acceptance of anxious thoughts and feelings than the imaginal delivery of metaphor (see Table 6). There was also a significant difference between groups during the recovery period, $F (1, 89) = 9.461, p < .01, \eta_p^2 = .069$, such that the behavioral group had lower scores than the imaginal group, particularly relative to baseline (both recovery scores are higher than baseline but behavioral change score = 15.06 and imaginal change score = 10.15).

**DSQ panic symptoms.** Total panic symptom frequency and severity were expected to be lower for the behavioral group than for the imaginal group. Two separate trial x condition ANOVAs were conducted on total frequency and severity of panic
symptoms. Scores for panic symptom frequency and severity across conditions can be seen in Table 7. With respect to total frequency of panic symptoms, there was no significant main effect of condition. However, there was a significant trial x condition interaction, $F(2, 89) = 3.45, p < .05, \eta_p^2 = .033$. Contrasts revealed that there were no differences between groups in trial 1 but there were differences between groups in trial 2, $F(1, 89) = 4.63, p < .05$ and during recovery, $F(1, 89) = 4.88, p < .05$. In terms of total panic symptom severity, there was a significant main effect of condition, $F(2, 89) = 4.47, p < .05, \eta_p^2 = .043$, but no trial x condition interaction.

Similar to total symptom scores, there was no main effect but a significant trial x condition interaction, $F(2, 89) = 3.21, p < .05, \eta_p^2 = .074$, with respect to frequency of physical panic symptoms (one subscale of the DSQ including 12 items), with significant differences during the 2nd CO$_2$ trial, $F(1, 89) = 5.38, p < .05$ and during recovery, $F(1, 89) = 5.137, p < .05$. There was only a significant main effect of condition but no interactions for severity of physical panic symptoms across trials, $F(2, 89) = 4.49, p < .05, \eta_p^2 = .044$ but no condition x trial interaction. With respect to DSQ cognitive symptoms (another subscale of the DSQ including 3 items), there were no significant differences between conditions or significant condition x trial interactions.

**Behavioral Willingness Analyses**

It was expected that individuals in the behavioral group would have reduced behavioral avoidance and show lower dropout rates, faster latency to begin each CO$_2$ trial, and show more willingness to participate in a third CO$_2$ procedure relative to those in the imaginal group. Contrary to expectation, there were no differences between groups with respect to time to begin each CO$_2$ trial and no interaction, $p > .05$. However, a $X^2$
test revealed a significant difference between groups such that participants in the 
behavioral condition (71%) were more willing to participate in another CO2 trial than 
participants in the imaginal condition (28.3%), $X^2 (1, 91) = 16.71, p < .05, \eta_p^2 = .429$.

Independent samples t-tests further revealed that groups also differed with respect to how 
willing they were to participate in a 3rd CO2 trial, $t(49) = 2.57, p < .05, \eta_p^2 = .067$, such that 
behavioral participants ($M = 1.78, SD = 1.25$) were more willing than imaginal 
participants ($M = 1.11, SD = 1.25$). On average, participants stated that they were 
between a little bit willing and mostly willing to participate in another challenge.

However, neither group was very willing to participate in a more intense version of the 
CO2 trial, $p > .05$. A small number of participants dropped out of the study (imaginal = 5, 
behavioral = 2). Thus, dropout rates were not examined.

**Heart Rate Response Analyses**

No differences were expected between the behavioral and imaginal group with 
respect to heart rate during the 2 CO2 trials. However, the behavioral group was expected 
to recover more quickly back to baseline levels than the imaginal group. A repeated-
measures ANOVA was conducted on heart rate response to test for significant trial (pre-
baseline, 1st CO2, 2nd CO2 and recovery) and condition (imaginal, behavioral) main 
effects and a significant trial by condition interaction. Mean heart rate levels for separate 
trials across conditions can be seen in Table 4. There was a significant trial main effect, 
$F(3, 87) = 119.97, p < .01, \eta_p^2 = .574$ and a significant main effect of condition, $F(3,87) = 
5.14, p < .05, \eta_p^2 = .055$ but no significant interactions. More specifically, the behavioral 
group did better overall than the imaginal group, despite no significant differences in 
baseline levels.
Relationship Between Outcomes and Perceived Usefulness

Given the significant differences between groups in terms of overall perceived usefulness of the metaphor intervention during the CO2 trials, we sought to examine whether perceived usefulness mediated the relation between significant group differences on self-report outcomes. In order to determine the effects of perceived usefulness, repeated-measures ANCOVA’s with perceived usefulness as a covariate were conducted for self-evaluative ratings, and total as well as physical panic symptom scores. Results showed that the significant differences between conditions remained for all 5 self-evaluative ratings even when perceived usefulness was controlled for. However, many of the trial x condition interactions dropped to non-significance once perceived usefulness was added as a covariate, $p > .05$.

With respect to total frequency or number (i.e., all 16 items) of DSQ panic symptom scores endorsed, the significant interaction effects (no main effects originally) dropped to non-significance when perceived usefulness was controlled for, $p > .05$. However, with respect to total severity or intensity of panic symptom scores, the significant main effects (no interaction effects originally) remained when perceived usefulness was added as a mediator. Consistent with total panic symptom scores, there were no longer any significant interaction effects for frequency of physical panic symptom scores but the significant main effects remained for severity of these scores.

In order to examine whether group differences in average heart rate across trials were mediated by perceived usefulness, repeated-measures ANCOVAs, with perceived usefulness as a covariate, were also conducted for heart rate scores. Perceived usefulness was found to mediate the difference between groups with respect to heart rate levels.
Discussion

Summary

From the perspective of newer acceptance-based approaches, including ACT, language itself can be problematic. More specifically, explanation, instruction and other more literal forms of language although necessary, may contribute to human suffering when it leads to rigid and inflexible control and avoidance. For this reason, other less literal forms of communication, including metaphor, are often incorporated into therapy in order to foster psychological flexibility. Given the common clinical use of metaphor and other similar approaches (e.g., experiential exercises and paradox) in ACT and other acceptance-based therapies, empirical research is starting to emerge evaluating the effectiveness of metaphor as a therapeutic technique. As discussed previously, acceptance-based metaphor and exercises have been shown to have a more positive effect on outcome (including more behavioral willingness to engage in unpleasant tasks) than acceptance instruction. Moreover, studies across varying modalities have found metaphor use in psychotherapy to have several advantages, including increasing the memorability of therapeutic information, and decreasing behavioral avoidance, emotional discomfort, believability and subjective distress.

Although preliminary research has been valuable in showing that the use of metaphor and exercises in a therapeutic context can lead to positive outcomes, there are gaps in this literature. In fact, despite the common use of metaphor in ACT clinical practice, most studies have only used acceptance instruction to train their participants. Moreover, no studies have explored the impact of metaphor within an acceptance context in relation to anxiety pathology. In particular, no previous studies have examined whether
metaphor is differentially more or less effective when delivered behaviorally versus verbally (i.e., imagined). This is surprising given the important focus on direct experience in ACT, and particularly learning through behavior or action.

Thus, the purpose of the present experiment was to close this gap by exploring the relative impact of an acceptance-based metaphor when imagined versus behaviorally enacted within ACT. The results of this study, while complex, showed that despite having the same acceptance message, the behavioral delivery of metaphor was more effective than the imaginal delivery of metaphor across self-report, behavioral and heart rate indices. The behavioral delivery of metaphor appeared more effective, at least at certain time points, even with equivalent pre-experimental anxiety levels, expectations of usefulness, engagement with the learned strategy presented via video, familiarity with the finger trap and reported everyday use.

More specifically and consistent with expectation, the behavioral delivery of metaphor contributed to less self-reported subjective distress, upsetting thoughts, fear and anxiety and urges to escape the situation, particularly during the 2nd CO2-enabled air trial. Additionally, the behavioral condition led to higher endorsed acceptance of thoughts, feelings and physical reactions following the 2nd CO2 trial. This was the case despite no differences between groups with respect to how intensely they rated their bodily reactions (i.e., on a scale from 1-100 on VAS evaluative rating scale #2).

It is important to note that there were no differences between groups on the evaluative rating scales during the 1st 5 minute CO2 trial. Qualitative responses by participants at the end of the experiment suggest that for many individuals, anxiety was so high at first due to the aversive nature of the stimulus (i.e., the intensity of the 10%
CO₂-enriched air) that participants did not feel that they had adequate time to process the acceptance-based strategy that they learned. However, by the 2nd 5 minute CO₂ trial, participants in the behavioral condition, with more time to process the message over time, showed greater acceptance of aversive thoughts, feelings and sensations, rather than engaging in futile attempts to control them. In contrast, more participants in the imaginal condition remained distressed and showed less acceptance of what they were feeling. Additionally, some participants in both groups stated that they started to use other strategies (e.g., control, distraction, reappraisal) during the 1st CO₂ trial but when those did not work, they were willing to try to accept what they were feeling and let go of attempts to control their anxiety. It is unclear if this happened more in the behavioral group and whether this contributed to the significant differences between conditions, although this could be one possible explanation. In future studies, it would be important to continuously monitor the strategies that participants used throughout the task, rather than only at termination as in the present study.

For most evaluative rating scales, there were no significant differences between conditions at recovery. However, individuals in the behavioral condition had lower recovery scores with respect to how upsetting their thoughts were and how accepting they were of their thoughts, feelings and physical reactions relative to baseline scores. Even so, interestingly there seemed to be a trend towards recovering more quickly and drastically from the 2nd CO₂ trial in the imaginal condition than in the behavioral condition, suggesting that termination of the CO₂ was perceived as more reinforcing for the imaginal group, possibly because they were more avoidant during the CO₂ trials. Given the complexity of these findings, further exploration of the nature of self-reported
recovery in studies using CO\textsubscript{2} provocations is necessary, including what factors might contribute to faster recovery and why.

Metaphor delivery method also affected the number of self-reported panic symptoms. There were no significant differences between groups during the first CO\textsubscript{2} trial with respect to frequency of panic symptoms but participants who behaviorally acted out the metaphor showed fewer panic symptoms during the 2\textsuperscript{nd} CO\textsubscript{2} trial and during recovery than participants in the imaginal condition. This was particularly the case with respect to endorsed physical panic symptoms. There was a significant difference between groups overall with respect to severity of panic symptoms, such that the behavioral delivery of metaphor group had less severe symptoms across trials. This suggests that learning the benefits of accepting one’s panic-related sensations by experiencing those benefits behaviorally, enhances the possibility of experiencing less intense panic-related physical sensations as well as recovering more quickly from them. These results provide further evidence in support of acceptance as an intervention technique more generally, as well as the added advantage of delivering an acceptance-based metaphor behaviorally.

Participants in the behavioral condition were also less behaviorally avoidant, as indexed by willingness to engage in another biological challenge procedure. Overall, consistent with theory and evidence showing that acceptance promotes psychological flexibility and behavioral engagement, both groups were mostly willing to engage in a third CO\textsubscript{2} trial. Even so, there were significant differences between groups with respect to how willing they were. Again, this suggests that increasing behavioral engagement with a therapeutic message may make that message more effective than just imagining it, at least in the case of metaphor, and may contribute to a willingness to move forward in
activities, despite anxiety and discomfort that may show up. Participants in the behavioral condition showed more willingness to engage in another CO$_2$ trial, even despite a decent number of intense panic symptoms.

Contrary to hypotheses, participants in both conditions responded in the same way with respect to latency to begin the 2$^{nd}$ CO$_2$ trial. This result makes sense, given that the groups responded with the same levels of distress during the 1$^{st}$ CO$_2$ trial. Additionally, there were some methodological difficulties that likely biased the results, which included participants not understanding the directions for how to start the next trial as well or other unforeseen delays. Future studies would benefit from setting up the program to correct for such errors or even to manipulate whether participants are able to start the CO$_2$ trials or not, to determine how the predictability of initiating panic-like symptoms oneself affects the results.

Contrary to hypotheses, but consistent with self-report and behavioral indices, psychophysiological response as measured by heart rate discriminated between groups such that participants in the behavioral delivery of metaphor condition had lower heart rate levels overall relative to participants in the imaginal condition. This was the case even despite no significant differences between groups at pre-baseline (as assessed in order to determine the success of random assignment). Although, significant differences between groups were predicted at recovery, significant differences in heart rate levels overall were unexpected. As this was the first study of its kind, we made our predictions based on speculation, as well as results of previous studies (e.g., Eifert & Heffner, 2003; Levitt et al., 2004) which found no differences between acceptance and control groups in terms of heart rate levels, purportedly due to the intense visceral reaction produced by the
CO₂ procedure (Zvolensky & Eifert, 2001). However, it makes sense that a higher frequency of panic symptoms and more distressing thoughts/feelings, as well as lower acceptance, would go hand-in-hand with increased heart rate. Further exploration is needed to clarify the contradictory findings between this and previous studies and to understand what factors may contribute to such differences.

Results also showed that although expectancy of usefulness did not differ across groups, actual perceived usefulness of the metaphor intervention during the CO₂ trials was higher overall in the behavioral condition than in the imaginal condition. Thus, participants in the behavioral condition may have had more positive outcomes, in part because they perceived the metaphor intervention as more helpful in coping with the adverse effects of the CO₂ trial when delivered behaviorally. Indeed, with respect to frequency of panic symptoms (both total and physical subscale) as well as heart rate scores, there were no longer significant differences once the effects of perceived usefulness were controlled for. However, results showed there to still be significant differences between the behavioral and imaginal conditions for all 5 of the self-evaluative ratings reported above as well as severity of panic symptoms (both total and physical subscale). These conflicting findings suggest that perceived usefulness of the intervention alone, while important, does not account for the benefits of delivering metaphor behaviorally. Future research is necessary to further substantiate the effects of the perceived usefulness of metaphor and its delivery during CO₂ provocations or other distressing situations and what other mechanisms, if any, might also be responsible.

Participants in the behavioral metaphor condition also reported that they would be more likely to use the strategy that they learned in the future, further attesting to its
relevance for participants. Interestingly, there were no self-reported differences between groups in terms of how meaningful or impactful the intervention was considered to be. On the one hand, these results are somewhat surprising given that the behavioral delivery of metaphor was expected to have positive effects because it made the acceptance message more meaningful for participants. On the other hand, it could be argued that the behavioral delivery of metaphor was perceived or evaluated by participants to have less of an impact than it actually did. An interesting area for further study might be to examine clients’ levels of awareness of the positive impact of learning a metaphor behaviorally.

Overall, the effect size, or the magnitude of the differences between the behavioral and imaginal delivery of metaphor conditions ranged from small to large. With respect to the VAS scales 5 out of the 8 showed differences (i.e., main effects) between conditions of a medium magnitude overall, large differences in the 2nd CO₂ trial and small to medium sized differences during recovery, in favor of the behavioral delivery of metaphor. For total panic symptom frequency the size of the difference between conditions during the 2nd CO₂ trial was large, and moderate for total panic symptom severity. Additionally, with respect to engaging in a 3rd CO₂ trial, the magnitude of differences between conditions ranged from high to medium for willingness (i.e., gave a yes response) and how willing, respectively. Lastly, the size of the difference between groups for heart rate was in the medium range.

Taken together, these findings are noteworthy and suggest that the difference between the behavioral delivery and imaginal delivery of metaphor conditions, and the beneficial effects of delivering metaphor behaviorally, is not only statistically significant
but also clinically significant. It is important to note that participants were not only told about panic symptoms or observed someone panicking, but they actually experienced real panic symptoms themselves during this experiment. Thus, the size of these differences are meaningful and are expected to generalize to real life settings and translate well to the delivery of metaphorical interventions with individuals who present to treatment for panic and other anxiety disorders.

Clinical Implications

These findings have several implications for the use of metaphor in clinical practice. These results are consistent with the notion that enacting metaphors behaviorally may facilitate client confidence in the usefulness of treatment interventions and other positive outcomes by creating the opportunity for clients to have a wider range of novel behavioral experiences, which may promote psychological flexibility. Such metaphors anchor the therapeutic message in actual behavior, which may make a message more salient and powerful for a client. Within the context of ACT, this may lead to more successfully learning that an active willingness to have unwanted thoughts and feelings (i.e., like pushing into the finger trap) is likely to be more effective and lead to a better quality of life than unworkable attempts at persistent and excessive control (i.e., struggling to get out of the finger trap).

Additionally, and as is true in clinical practice, participants and particularly those in the behavioral metaphor condition, seemed to show better outcomes after being able to process the message over time (i.e., by the 2nd CO2 trial). In some ways, it may be considered surprising that the intervention led to significantly better outcomes in the behavioral condition at all given that the period of time given to participants to process
the acceptance message was much shorter than it would have been in a true clinical setting. These findings further attest to the value of learning by direct experience (i.e., those in the behavioral condition were able to practice the intervention before going into an aversive situation). Even in clinical settings, therapists only have a limited amount of time to communicate information each week and these results suggest that not only bringing metaphors into session but also delivering them behaviorally may lead to more efficient transmission of information from therapist to clients.

Based on the extant empirical literature, it is unclear at this point how often metaphors are really acted out in session, even despite the important emphasis of experiencing by doing in ACT. Clinicians may believe that it is unfeasible to engage in or model a metaphor for a client or may feel uncomfortable doing so. Indeed, some metaphors are not conducive to engaging in behaviorally in session (e.g., feeding the tiger, swamp metaphor). Even so, it is hoped that the results of this study and future similar studies will show how useful and efficient it can be for clients to experience the futility of control via behavioral engagement. Thus, it is anticipated that clinicians will more readily use in-session metaphor-based behavioral exercises (e.g., finger traps, tug-of-wars, and chessboards, to name a few), or even develop their own metaphors to be acted out in treatment. It would be interesting in future studies to identify factors that may contribute to a clinician’s decision to engage in behavioral interventions in session versus using language alone to describe metaphor.

Limitations

Despite the relevance and novelty of this study, these results are preliminary and a number of limitations must be acknowledged. First, this study was not conducted in a
double-blind manner. Although, attempts were made to support neutrality, the study’s experimenter was aware of the hypotheses and may have given off cues, without realizing it, which differed across groups. However, participants watched a standardized video in each condition. Moreover, after watching the video, participants’ expectancy effects and engagement in the video were shown not to differ across groups. Even so, future studies might benefit from using different experimenters for each condition who are not aware of the hypotheses of the study.

Additionally, it was not feasible to include a control group in the present study that offered acceptance instruction alone as an intervention while still retaining enough power to find significant differences between groups. Without an acceptance instruction condition, it is unclear whether anchoring an acceptance intervention in metaphor is more effective than acceptance instruction alone, within the context of anxiety pathology. Even so, studies focusing on other forms of psychopathology, including depression and pain, have found metaphor combined with experiential exercises to have superior outcomes relative to instruction alone. Thus, the assumption was made that an instruction only condition might be superfluous and unnecessary for the purposes of the present study. However, future studies would benefit from comparing delivery of an acceptance message via metaphor versus instruction alone in order to truly evaluate the effectiveness of metaphor in a controlled manner.

As another limitation, we used an undergraduate non-clinical sample consisting of participants who were not currently receiving psychotropic medications or psychological treatment for any disorders. Thus, while females high in anxiety sensitivity are at-risk for the development of panic disorder, they may have already been using successful
Strategies to cope with their anxiety, and the intervention may have been less salient than it would have been for a clinical sample. However, evaluative rating scores and panic symptom frequency and severity were at a moderately high level on average during the CO₂ provocations, and participants appeared sufficiently distressed. Even so, future studies would benefit from using a clinical sample from a community population of individuals who suffer from anxiety disorders in order to determine if these results would generalize to more severe populations.

Additionally, while CO₂-enriched air procedures have consistently been shown to mimic panic symptoms, including thoughts and physical sensations (Eifert & Heffner, 2003; Forsyth et al., 2000; Levitt et al., 2004; Schmidt et al., 2006; vanden Hout & Griez, 1984), this provocation is unnatural, and takes place in a controlled environment, which may have affected participant responding. Additionally, although participants were unaware of the duration of the CO₂ trials, participants started each of the CO₂ trials themselves, which offered some predictability that would be absent when an actual panic attack occurs. As another limitation, the masks and heart rate recording equipment attached to the participants might have been distracting for them and exacerbated feelings of discomfort and anxiety. Even so, the equipment worn did not differ between groups. Future research of this kind might benefit from examining the effects of the laboratory environment and experimental equipment on participant’s thoughts, feelings and physical sensations during biological provocations.

It should also be noted that the acceptance-based metaphor used in the present study is only one small component of a larger and much more complex therapy, which includes a number of other acceptance- and mindfulness-based exercises, metaphors and
other approaches. Thus, the effects seen here should not be mistaken with the effects of ACT as a whole. Moreover, the metaphor-based intervention provided in the present study was only 7 minutes long, and thus it is unclear how these results might generalize to a real life clinical setting, in which treatment is provided over a longer duration. Within reason, future studies would benefit from exploring the impact of metaphor delivery within the context of randomized clinical trials, or providing the intervention across several days before undergoing the CO$_2$ trials.

**Conclusion**

In the interest of delivering effective treatments for anxiety disorders and other forms of psychopathology, the field of psychology is constantly challenged to find ways to improve the impact of therapeutic information. Newer approaches, such as ACT, which incorporate the use of metaphors and exercises to foster acceptance and mindfulness, have been shown to be effective in treating a wide range of problems and to help people live more meaningful lives. Metaphors and exercises are used in such approaches in order to circumvent the problematic aspects of language and to facilitate treatment outcomes. Yet to date, most studies within the ACT literature evaluating acceptance as a therapeutic intervention have been conducted within the context of instruction, despite recognition that acceptance instruction alone is often unsuccessful. Indeed, only a few recent studies have begun to compare the utility of using acceptance-based metaphors and exercises relative to instruction only. Despite the focus in ACT on behavioral experiencing, no studies have compared the effectiveness of imaginal metaphor (i.e., learning something verbally without experiencing directly) versus metaphor that is acted out behaviorally or learned by direct experience.
The present study aimed to address the gap in the empirical literature by evaluating if the form of delivery of a metaphor intervention matters; that is, whether there are significant differences between the imaginal and behavioral delivery of metaphor. Overall, the results showed that delivering metaphor behaviorally was more effective for approaching acute panicogenic distress compared to verbalizing and having an individual imagine a metaphorical situation (i.e., being stuck in a finger trap). These results have important clinical implications for the use of metaphor, not only in ACT, but in other newer and more traditional therapeutic approaches as well. It is hoped that these findings will lead to clinicians to be more inclined to take the time and effort to use and even develop metaphors that can be acted out with their clients in session, so that clients can get the most out of treatment and live better quality of lives. However, while these finding are valuable, these results are not necessarily equivalent to the effectiveness of metaphor relative to other ACT interventions or even the effectiveness of ACT as a whole. Thus, future research is necessary to clarify these findings, in order to expand upon and refine the clinical empirical literature overall and the ACT literature more specifically.
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Table 1

Demographic Characteristics for the Behavioral and Imaginal Groups

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<tr>
<th></th>
<th>Behavioral</th>
<th>Imaginal</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>20.71</td>
<td>19.74</td>
</tr>
<tr>
<td>SD</td>
<td>3.85</td>
<td>2.51</td>
</tr>
<tr>
<td>Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>46%</td>
<td>42%</td>
</tr>
<tr>
<td>African American</td>
<td>28%</td>
<td>25%</td>
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<tr>
<td>Asian American</td>
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<td>11%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Other</td>
<td>7%</td>
<td>10%</td>
</tr>
<tr>
<td>Year in College</td>
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<tr>
<td>Freshman</td>
<td>32%</td>
<td>36%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>20%</td>
<td>22%</td>
</tr>
<tr>
<td>Junior</td>
<td>26%</td>
<td>22%</td>
</tr>
<tr>
<td>Senior</td>
<td>22%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Table 2

*Means and Standard Deviations of Pre-Experimental Measure Scores for the Behavioral and Imaginal Groups*

<table>
<thead>
<tr>
<th>Pre-experimental measure</th>
<th>Behavioral Mean</th>
<th>Behavioral SD</th>
<th>Imaginal Mean</th>
<th>Imaginal SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASI Total</td>
<td>27.20</td>
<td>8.18</td>
<td>26.67</td>
<td>8.59</td>
</tr>
<tr>
<td>ACQ Total</td>
<td>32.65</td>
<td>5.08</td>
<td>32.00</td>
<td>5.89</td>
</tr>
<tr>
<td>CQ Total</td>
<td>20.39</td>
<td>13.58</td>
<td>24.99</td>
<td>13.72</td>
</tr>
<tr>
<td>STICSA Total</td>
<td>29.69</td>
<td>8.36</td>
<td>30.51</td>
<td>11.25</td>
</tr>
<tr>
<td>AAQ-II Total</td>
<td>18.49</td>
<td>8.93</td>
<td>18.51</td>
<td>9.00</td>
</tr>
<tr>
<td>BAFT Total</td>
<td>53.67</td>
<td>19.64</td>
<td>51.14</td>
<td>17.33</td>
</tr>
<tr>
<td>MCS Total</td>
<td>7.24</td>
<td>2.04</td>
<td>7.31</td>
<td>1.83</td>
</tr>
</tbody>
</table>

*Note. ASI = Anxiety Sensitivity Index; ACQ = Anxiety Control Questionnaire; CQ = Claustrophobia Questionnaire; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; AAQ-II = Acceptance and Action Questionnaire-II; BAFT = Believability of Anxious Feelings and Thoughts Questionnaire; MCS = Marlowe-Crowne Scale-13*
Table 3

Means and Standard Deviations of Responses to Pre-Experimental Questionnaires and Baseline Heart Rate by Recruitment Strategy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Research Pool</th>
<th></th>
<th>Paid</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-experimental measure</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>ASI Total</td>
<td>25.61</td>
<td>8.26</td>
<td>29.10</td>
<td>8.15</td>
</tr>
<tr>
<td>ACQ Total</td>
<td>32.31</td>
<td>5.71</td>
<td>32.54</td>
<td>5.39</td>
</tr>
<tr>
<td>CQ Total</td>
<td>21.71</td>
<td>12.45</td>
<td>24.15</td>
<td>15.57</td>
</tr>
<tr>
<td>STICSA Total</td>
<td>30.43</td>
<td>10.98</td>
<td>29.95</td>
<td>8.33</td>
</tr>
<tr>
<td>AAQ-II Total</td>
<td>18.26</td>
<td>9.04</td>
<td>19.08</td>
<td>8.92</td>
</tr>
<tr>
<td>BAFT Total</td>
<td>52.71</td>
<td>17.30</td>
<td>58.08</td>
<td>18.54</td>
</tr>
<tr>
<td>MCS Total</td>
<td>6.94</td>
<td>2.14</td>
<td>7.76</td>
<td>1.46</td>
</tr>
<tr>
<td>Heart Rate Pre Mean</td>
<td>75.74</td>
<td>9.98</td>
<td>75.42</td>
<td>9.03</td>
</tr>
</tbody>
</table>

Note. ASI = Anxiety Sensitivity Index; ACQ = Anxiety Control Questionnaire; CQ = Claustrophobia Questionnaire; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; AAQ-II = Acceptance and Action Questionnaire-II; BAFT = Believability of Anxious Feelings and Thoughts Questionnaire; MCS = Marlowe-Crowne Scale-13
### Table 4

**Means, Standard Deviations and Ranges for Pre-CO₂ Manipulation Checks Administered Immediately Following Intervention (Video)**

<table>
<thead>
<tr>
<th>Manipulation Check</th>
<th>Total</th>
<th>Behavioral Condition</th>
<th>Imaginal Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Min</td>
</tr>
<tr>
<td>Expectancy</td>
<td>3.48</td>
<td>.95</td>
<td>1</td>
</tr>
<tr>
<td>Everyday use</td>
<td>1.91</td>
<td>.65</td>
<td>1</td>
</tr>
<tr>
<td>Familiarity with finger trap</td>
<td>2.57</td>
<td>.70</td>
<td>1</td>
</tr>
<tr>
<td>Engagement in video</td>
<td>3.59</td>
<td>.73</td>
<td>2</td>
</tr>
</tbody>
</table>

Note. M = mean, SD = standard deviation, Min = minimum, Max = maximum; expectancy (i.e., expected usefulness) scale ranges from 1-5, everyday use scale ranges from 1-4, familiarity scale ranges from 1-3 and engagement in video scale ranges from 1-5.
Table 5

*Means, Standard Deviations and Ranges for Perceived Usefulness, Willingness to Use in Future and Meaning/Impact of Metaphor Strategy at Post CO₂ Trials*

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Behavioral Condition</th>
<th>Imaginal Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Min</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>5.14</td>
<td>1.95</td>
<td>0</td>
</tr>
<tr>
<td>Willingness to use in future</td>
<td>5.36</td>
<td>1.74</td>
<td>0</td>
</tr>
<tr>
<td>Meaning/Impact</td>
<td>5.35</td>
<td>1.34</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. M = mean, SD = standard deviation, Min = minimum, Max = maximum; perceived usefulness and meaning/impact of metaphor intervention during the CO₂ trials were scored on a scale from 0 = not at all to 8 = extremely; willingness to use in the future was scored on a scale from 0 = never to 8 = all of the time.
Table 6

*Means and Standard Deviations of VAS Evaluative Rating Scores and Heart Rate for the Behavioral and Imaginal Conditions Across Trials*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental Phase</th>
<th></th>
<th></th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td>CO₂ trial 1</td>
<td>CO₂ trial 2</td>
<td>Recovery</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Subjective Distress</td>
<td>Behavioral</td>
<td>17.70</td>
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</tr>
<tr>
<td></td>
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<td>21.00</td>
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<td>60.22</td>
<td>26.73</td>
<td>59.96</td>
<td>24.36</td>
</tr>
<tr>
<td>Intensity of Reactions</td>
<td>Behavioral</td>
<td>15.57</td>
<td>18.72</td>
<td>62.30</td>
<td>28.28</td>
<td>46.94</td>
<td>29.73</td>
</tr>
<tr>
<td></td>
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<td>17.59</td>
<td>59.87</td>
<td>27.51</td>
<td>58.62</td>
<td>26.83</td>
</tr>
<tr>
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<td>19.59</td>
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<td>19.27</td>
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<tr>
<td>Fear/Anxiety</td>
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<td>17.20</td>
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<tr>
<td></td>
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<tr>
<td>Urge to Escape</td>
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<td>21.39</td>
<td>52.54</td>
<td>33.84</td>
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<tr>
<td></td>
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<td>26.10</td>
<td>58.69</td>
<td>31.06</td>
<td>56.62</td>
<td>31.55</td>
</tr>
<tr>
<td>Struggle to Control</td>
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<td>18.81</td>
<td>41.52</td>
<td>28.34</td>
<td>30.30</td>
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<tr>
<td></td>
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<td>20.42</td>
<td>47.89</td>
<td>34.19</td>
<td>42.62</td>
<td>32.73</td>
</tr>
<tr>
<td>Acceptance</td>
<td>Behavioral</td>
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<td>54.26</td>
<td>23.16</td>
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<tr>
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<td>55.78</td>
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</tr>
<tr>
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<td>29.94</td>
<td>27.30</td>
<td>47.07</td>
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<td>36.33</td>
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<tr>
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<td>48.36</td>
<td>32.49</td>
<td>48.84</td>
<td>30.23</td>
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<tr>
<td>Heart Rate</td>
<td>Behavioral</td>
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<td>10.13</td>
<td>82.26</td>
<td>9.35</td>
<td>81.71</td>
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<td>8.60</td>
<td>86.37</td>
<td>11.98</td>
<td>88.03</td>
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</table>
Table 7

*Means and Standard Deviations of DSQ Panic Symptoms for the Behavioral and Imaginal Conditions Across Trials*

<table>
<thead>
<tr>
<th>DSQ</th>
<th>Experimental Phase</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>CO₂ trial 1</td>
<td>CO₂ trial 2</td>
<td>Recovery</td>
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<tr>
<td>Panic Symptom Frequency</td>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Behavioral</td>
<td>6.78</td>
<td>3.47</td>
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<td>5.30</td>
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<td>6.73</td>
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<tr>
<td>Panic Symptom Severity</td>
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<td>Mean</td>
<td>SD</td>
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<tr>
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<td></td>
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<tr>
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<td>2.25</td>
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<tr>
<td>Physical Panic Frequency</td>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Behavioral</td>
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<td></td>
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</tr>
<tr>
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<tr>
<td>Cognitive Panic Frequency</td>
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<td>Mean</td>
<td>SD</td>
</tr>
<tr>
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<td>1.32</td>
</tr>
<tr>
<td>Physical Panic Severity</td>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
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<td></td>
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<td>1.34</td>
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<tr>
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<tr>
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<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
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<tr>
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<td>2.20</td>
<td></td>
<td>.783</td>
<td>1.49</td>
</tr>
</tbody>
</table>

Note. DSQ = Diagnostic Symptoms Questionnaire
Figure 1. Reported differences between groups in the use of each emotion regulation strategy.
Appendix A:

Medical and Psychological Pre-Screening Risk Assessment

MEDICAL-Psychiatric History Screening Interview (1 of 3)
The Impact of Acceptance Techniques on Anxiety
April, 2012

Subject Name: ____________________________________________ (remove name/phone and replace with Assigned Study Number: __________________)

Date: ______ / ______ / ______
Home Phone: ( ) ______ - ______ Work Phone: ( ) ______- ______ Interviewer: _______________________

GENERAL BACKGROUND QUESTIONS
Age: ______ Approximate Height: ______” Approximate Weight: ______ lbs.
(Note: Check Weight Chart, If Possibly Morbidly Obese, STOP!)

Are you Fluent in Written English?: Y N (Note: If NO, STOP!)

Sex: ☐ Male ☐ Female
Race: ☐ Caucasian ☐ African American ☐ Native American ☐ Asian America ☐ Latino ☐ Other (specify): __________
Marital Status: ☐ Single ☐ Married ☐ Widowed ☐ Divorced ☐ Cohabiting ☐ Separated ☐ Other (specify): __________
Year in College: ☐ Freshman ☐ Sophomore ☐ Junior ☐ Senior

MEDICAL HISTORY QUESTIONS
The first questions I’m going to ask you are about your medical history. Please wait until I have finished speaking and then simply answer “yes” or “no.” Also, keep in mind that your responses to all questions will be completely anonymous. Do you have any questions? If not, then let’s begin. Have you been diagnosed with, or do you presently suffer from, any of the following?

1. Heart Disease
2. Any Heart Conditions/Problems
3. Asthma
4. Respiratory Disease YES ☐ NO ☐
5. Renal (Kidney) Disease
6. Serious Concussion/Head Injury
7. HIV/AIDS
8. Persistent or Chronic Anemia
9. Stroke
10. Epilepsy
11. Seizure Disorders YES ☐ NO ☐
12. Diabetes
13. Hypertension (High BP)
14. Migraine Headaches
15. Sleep Apnea
16. Are you currently pregnant, or do you suspect you may be pregnant?

Interviewer: You must ask the subject both sets of questions (items 1-8 and items 9-16). If the subject answers YES to EITHER set of questions, STOP and read the subject the Exclusion Script once you’ve read all of the questions.

Interviewer: If the subject answers NO to all of the above, CONTINUE.
17. Are you currently being treated for any physical disease or condition? YES ☐ NO ☐ If YES, then for what problem(s)?

18. Are you currently taking any medications for a medical condition, aside from allergy medication or birth control? YES ☐ NO ☐

If YES, then for what problem? ____________________________________________ (note: if medication use is related any of the problems on the above list, then STOP and read them the Exclusion Script, otherwise continue)

PSYCHOLOGICAL EMOTIONAL HISTORY
Ok, we’re ready to move on to the next series of questions. These questions deal with your psychological or emotional history. Some of these questions may or may not apply to you. Again, you can simply answer “yes” or “no.”

19. Have you ever sought treatment for psychological or emotional difficulties? YES ☐ NO ☐
20. Are you currently being treated for psychological or emotional difficulties? YES ☐ NO ☐ If YES, STOP!
21. Have you ever been hospitalized for a psychological or emotional problem? YES ☐ NO ☐
22. Have you ever been prescribed medications for a psychological or emotional problem? YES ☐ NO ☐
23. Are you currently taking medications for a psychological or emotional problem? YES ☐ NO ☐ If YES, STOP!
24. Have you ever had strange or unusual experiences such as: Hearing voices or conversations when no one was around, or seeing things no one else saw? YES ☐ NO ☐ If YES, STOP!
25. Have you been having any thoughts about hurting yourself? YES ☐ NO ☐ If YES, STOP!

Interviewer: Read all questions 19-25. If the subject says YES to any items marked with * then STOP and read them the Exclusion Script once you’ve read all of the questions.

Note: If the subject says YES to item 25, follow these steps:
1. Call the Primary Investigator (Kristin Herzberg, 310-863-0767)
2. Refer the subject to the appropriate source (e.g., SUNY Counseling Center, Psychological Services Center)
3. Provide the subject with the CDPC 24-hour hotline phone number: 447-9650

Interviewer: If subject says NO to all items with *, then CONTINUE.

OBSERVATION LEARNING EXPERIENCES (NOT USED FOR SUBJECT EXCLUSION)
26. Have you ever witnessed or observed someone:
   Faint ☐ Yes ☐ No
   Have a stroke ☐ Yes ☐ No

Now I am going to ask you some more questions about specific kinds of problems that may or may not apply to you. As I read each question, please keep in mind that an answer of “yes” means that you have the symptoms or experiences in the extreme, that they are particularly distressing and/or bothersome to you, and that they interfere with important aspects of your life. This is important because many of the questions I will be asking are commonly reported by most people in mild-to-moderate degrees. Again, it is extremely important that you think carefully about each question and answer openly and honestly so that you may avoid possible risks of participating in the later portions of this study. As with all other portions of this study, your responses will be kept strictly confidential.

PANIC DISORDER
27. Have you ever had, or do you currently have times when you feel a sudden rush of intense fear or discomfort that comes from “out of the blue,” for no apparent reason, or in situations where you did not expect them to occur? ☐ Yes ☐ No

AGORAPHOBIA
28. Do you currently feel panicky in any situations or avoid them because you might feel panicky? Again, here we are talking about extreme, personally distressing, and life disrupting symptoms and behaviors. ☐ Yes ☐ No

SOCIAL PHOBIA
29. Currently, in social situations where you might be observed or evaluated by others or when you are meeting new people, do you feel fearful, anxious, or nervous? Again, think extreme! ☐ Yes ☐ No

GENERALIZED ANXIETY DISORDER
30a. Over the last several months, have you been continually and excessively worried or anxious about a number of events or activities in your daily life aside from general concerns related to academic/college work? ☐ Yes ☐ No

30b. And, have you found this excessive worry difficult to control, personally distressing, and disruptive to your life? ☐ Yes ☐ No

OBSESSIVE COMPULSIVE DISORDER
31a. Currently, are you excessively bothered by thoughts, images, or impulses that keep recurring to you that seem inappropriate or nonsensical but that you can’t stop from coming into your mind? ☐ Yes ☐ No

31b. Currently, do you feel driven to repeat some behavior or to repeat something in your mind over and over again to try and feel less uncomfortable? Again we are talking about behaviors that are extreme, distressing, and difficult to control. ☐ Yes ☐ No

SPECIFIC PHOBIA
32. Currently, do you have an extreme fear or strong need to avoid such things as?:
   a. Animals (snakes, spiders, dogs, bees/insects) ☐ Yes ☐ No
   b. Natural Environment
      Heights ☐ Yes ☐ No
      Storms ☐ Yes ☐ No
      Water ☐ Yes ☐ No
   c. Blood/Injection/Injury: self or other
      Blood from a minor cut ☐ Yes ☐ No
      Receiving injections ☐ Yes ☐ No
      Having blood drawn ☐ Yes ☐ No
      Seeing blood or medical procedures ☐ Yes ☐ No
   d. Situational
      Elevators/small enclosed spaces ☐ Yes ☐ No IF YES, STOP!
      Driving ☐ Yes ☐ No
   e. Other
PTS/ACUTE STRESS DISORDER
33. Have you ever experienced or witnessed a traumatic or life-threatening event such as assault, rape, seeing someone badly injured or killed, combat, accidents, or natural or man-made disasters? □ Yes □ No If YES, then ask:
34. Does the memory of such events and/or experiences disrupt (think extreme), or otherwise interfere with your life now (e.g., frequent nightmares, poor sleep, recurrent memories, flashbacks, or avoidance of reminders)? □ Yes □ No If YES, STOP!
35. Have you ever had a life threatening swimming, scuba diving, or drowning experience? □ Yes □ No If YES, STOP!

MAJOR DEPRESSION
36. Currently, have you been feeling depressed, sad, empty, or have you lost interest or pleasure in almost all of your usual activities? Here again we are talking about emotions that are extreme, personally distressing, and disruptive. □ Yes □ No

DYSTHYMIC DISORDER
37. Over the past two years, have you frequently had days when you felt down, blue, or depressed most of the day? Here frequently and most of the day is key. □ Yes □ No

HYPOCHONDRIASIS
38. Over the past several months, have you continually feared or believed that you might have a serious physical disease or illness (cancer, heart disease, AIDS, etc.) despite information that suggests otherwise? □ Yes □ No If YES, STOP!

SOMATIZATION DISORDER
39a. Have you had a lot of different physical problems in your life? □ Yes □ No If YES, STOP!
39b. Over the past several years, have these physical problems prompted you to see the doctor on many occasions or have they significantly interfered with your life (e.g., job, social activities, school)? □ Yes □ No If YES, STOP!

NONORGANIC PSYCHOSIS/CONVERSION SYMPTOMS
40. Have you ever experienced a sudden loss or change in your physical functioning such as paralysis or seizures? □ Yes □ No If YES, STOP!

Interviewer:
If subject presents with no exclusionary criteria (negative on major psychopathology), go on to schedule an appointment. Note the date and time of the appointment here and in the appropriate lab scheduling log.

Scheduled Experiment Date: ___/___/_____ Scheduled Experiment Time: From ________ to _________
Appendix B (Self Report Questionnaires)

Anxiety Sensitivity Index (ASI)

Please rate each item by selecting one of the five answers for each question. Please answer each statement by circling the number that best applies to you.

<table>
<thead>
<tr>
<th></th>
<th>Very Little</th>
<th>A Little</th>
<th>Some</th>
<th>Much</th>
<th>Very Much</th>
</tr>
</thead>
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<td>1. It is important not to appear nervous</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. When I cannot keep my mind on a task, I worry that I might be going crazy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. It scares me when I feel shaky</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. It scares me when I feel faint</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. It is important to me to stay in control of my emotions</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. It scares me when my heart beats rapidly</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. It embarrasses me when my stomach growls</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>8. It scares me when I am nauseous (sick in the stomach)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. When I notice my heart beats rapidly, I worry that I might have a heart attack</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. It scares me when I become short of breath</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. When my stomach is upset, I worry that I might be seriously ill</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. It scares me when I am unable to keep my mind on a task</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. Other people notice when I feel shaky</td>
<td>0</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>14. Unusual body sensations scare me</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. When I am nervous, I worry that I might be mentally ill</td>
<td>0</td>
<td>1</td>
<td>2</td>
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<td>4</td>
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<tr>
<td>16. It scares me when I am nervous</td>
<td>0</td>
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<td>2</td>
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<td>4</td>
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</tbody>
</table>
Believability of Anxious Feelings and Thoughts Questionnaire (BAFT)

Imagine the following thoughts occurred to you right now. **How valid or believable would each be to you?** Please use the following scale. For each thought, please circle a number 1 through 7 depending on how believable that thought is to you.

<table>
<thead>
<tr>
<th>Scale</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Completely Believable</th>
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</thead>
<tbody>
<tr>
<td>Not at All Believable</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

1. _____I need to get a handle on my anxiety and fear for me to have the life I want.
2. _____Appearing nervous is not good and causes me to suffer.
3. _____I can’t really do the things that I want to do when I have anxiety and fear.
4. _____I must stay in control of my emotions.
5. _____If I were like other people, I would be able to get a grip on my anxious thoughts and feelings.
6. _____My anxious thoughts and feelings are a problem.
7. _____I am sure to be embarrassed and make a fool of myself when other people notice how nervous and shaky I feel.
8. _____Unusual body sensations are scary and something I need to act on to reduce or get rid of before I can do anything else.
9. _____My anxious thoughts and feelings are not normal.
10. _____Scanning my body for signs and symptoms of anxiety is important to keep me safe.
11. _____When I am very anxious or afraid there is a good chance that I might be dying.
12. _____I could lose control of myself when I feel anxious or afraid.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>I must do something about my anxiety or fear when I shows up.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>When unpleasant thoughts occur, I must push them out of my mind.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>When I feel bad, I must fight the feeling in order to make it go away.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>never true</td>
<td>very seldom true</td>
<td>seldom true</td>
<td>sometimes true</td>
<td>frequently true</td>
<td>almost always true</td>
<td>always true</td>
</tr>
</tbody>
</table>

1. My painful experiences and memories make it difficult for me to live a life that I would value.  
   1 2 3 4 5 6 7

2. I’m afraid of my feelings.  
   1 2 3 4 5 6 7

3. I worry about not being able to control my worries and feelings.  
   1 2 3 4 5 6 7

4. My painful memories prevent me from having a fulfilling life.  
   1 2 3 4 5 6 7

5. Emotions cause problems in my life.  
   1 2 3 4 5 6 7

6. It seems like most people are handling their lives better than I am.  
   1 2 3 4 5 6 7

7. Worries get in the way of my success.  
   1 2 3 4 5 6 7
State Trait Inventory for Cognitive and Somatic Anxiety (STICSA)

*Instructions:* Below is a list of statements which can be used to describe how people feel. Beside each statement are four numbers which indicate the degree with which each statement is self-descriptive of mood at this moment (e.g., 1 _not at all, 4 _very much so). Please read each statement carefully and circle the number which best indicates how you feel right now, at this very moment, even if this is not how you usually feel.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My heart beats fast.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. My muscles are tense.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I feel agonized over my problems.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I think that others won’t approve of me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I feel like I’m missing out on things because I can’t make up my mind</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. I feel dizzy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. My muscles feel weak.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. I feel trembly and shaky.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. I picture some future misfortune.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. I can’t get some thought out of my mind.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. I have trouble remembering things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. My face feels hot.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. I think that the worst will happen.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. My arms and legs feel stiff.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. My throat feels dry.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. I keep busy to avoid uncomfortable thoughts.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. I cannot concentrate without irrelevant thoughts intruding.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. My breathing is fast and shallow.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. I worry that I cannot control my thoughts as well as I would like to.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. I have butterflies in the stomach.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. My palms feel clammy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Listed below are a number of statements describing a set of beliefs. Please read each statement carefully and, on the 0-5 scale given, indicate how much you think each statement is typical of you.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1. I am usually able to avoid threat quite easily.
2. How well I cope with difficult situations depends on whether I have outside help.
3. When I am put under stress, I am likely to lose control.
4. I can usually stop my anxiety from showing.
5. When I am frightened by something, there is generally nothing I can do.
6. My emotions seem to have a life of their own.
7. There is little I can do to influence people's judgments of me.
8. Whether I can successfully escape a frightening situation is always a matter of chance with me.
9. I often shake uncontrollably.
10. I can usually put worrisome thoughts out of my mind easily.
11. When I am in a stressful situation, I am able to stop myself from breathing too hard.
12. I can usually influence the degree to which a situation is potentially threatening to me.
13. I am able to control my level of anxiety.
14. There is little I can do to change frightening events.
15. The extent to which a difficult situation resolves itself has nothing to do with my actions.
16. If something is going to hurt me, it will happen no matter what I do.
17. I can usually relax when I want.
18. When I am under stress, I am not always sure how I will react.
19. I can usually make sure people like me if I work at it.
20. Most events that make me anxious are outside my control.
21. I always know exactly how I will react to difficult situations.
22. I am unconcerned if I become anxious in a difficult situation, because I am confident in my ability to cope with my symptoms.
23. What people think of me is largely outside my control.
24. I usually find it hard to deal with difficult problems.
25. When I hear that someone has a serious illness, I worry that I am next.
26. When I am anxious, I find it difficult to focus on anything other than my anxiety.
27. I am able to cope as effectively with unexpected anxiety as I am with anxiety that I expect to occur.
28. I sometimes think, "Why even bother to try to cope with my anxiety when nothing I do seems to affect how frequently or intensely I experience it?"
29. I often have the ability to get along with "difficult" people.
30. I will avoid conflict due to my inability to successfully resolve it.
**Claustrophobia Questionnaire**

Please rate how anxious you would feel in the following places or situations by circling the most appropriate number:

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Swimming while wearing a nose plug</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Working under a sink for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Standing in an elevator on the ground floor with the doors closed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Trying to catch your breath during vigorous exercise</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Having a bad cold and finding it difficult to breath through your nose</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Snorkeling in a safe practice tank for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Using an oxygen mask</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Laying on a bottom bunkbed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Standing in the middle of the 3rd row at a packed concert realizing that you will be unable to leave until the end</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>In the center of a full row at a cinema</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>Working under a car for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>At the furthest point from an exit on a tour of an underground mine shaft</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>Lying in a sauna for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>Waiting in a plane on the ground with the door closed for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>Locked in a small DARK room without windows for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>Locked in a small WELL-LIT room without windows for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>Handcuffed for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>Tied up with hands behind back for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>Caught in tight clothing and unable to remove it</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>Standing for 15 minutes in a straitjacket</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21</td>
<td>Lying in a tight sleeping bag enclosing legs and arms, tied at the neck, unable to get out for 15 minutes</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>Having your legs tied to an immovable chair</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23</td>
<td>In a public washroom and the lock jams</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>In a crowded train which stops between stations</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
### Marlowe-Crowne Scale

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to your personality.

1. **It is sometimes hard for me to go on with my work if I am not encouraged.** T F
2. **I sometimes feel resentful when I don’t get my way.** T F
3. **On a few occasions, I have given up doing something because I thought too little of my ability.** T F
4. **There have been times when I felt like rebelling against people in authority even though I knew they were right.** T F
5. **No matter who I’m talking to, I’m always a good listener.** T F
6. **I’m always willing to admit it when I make a mistake.** T F
7. **There have been occasions when I took advantage of someone.** T F
8. **I sometimes try to get even rather than forgive and forget.** T F
9. **I am always courteous, even to people who are disagreeable.** T F
10. **I have never been irked when people expressed ideas very different from my own.** T F
11. **There have times when I was quite jealous of the good fortune of others.** T F
12. **I am sometimes irritated by people who ask favors of me.** T F
13. **I have never deliberately said something that hurt someone’s feelings.** T F
Appendix C

Scripts to all Participants

All Conditions

“Earlier it was explained to you that during this study you will be breathing in air that has more carbon dioxide than normal. During the procedure, you may experience physical sensations, including lightheadedness, sweatiness, faster breathing, faster heartbeat, or dizziness. These effects are temporary and will quickly disappear when you return to breathing normal room air. Emotionally, you may experience an increase in relaxation, anxiety, or excitement. Throughout the procedure we will be monitoring your physiological responses. In the first part of the procedure you will be breathing only normal room air and you will be asked to sit quietly and relax while some baseline measures are recorded. During the next part of the procedure, you will be breathing the mixed air. At different points during the experiment, you will be prompted to rate how you feel (point or refer to rating sheets and pencil in front of them). At those times, you will make your ratings. Make a slash anywhere on the line to make your rating. You must make a rating for each question in order to submit your answers. You will be in visual and auditory contact with the experimenter at all times through the two way mirror, video monitor, and intercom system so that if questions arise, you can talk and be heard by the experimenter. It is extremely important to sit as still as possible throughout the entire procedure and try not to move the hand with electrodes because movement will disrupt measurement of your physiological responses. It is also very important that you breathe regularly and do not hold your breath. Also try not to speak during the procedure because this, too, will affect the recordings. At any time, if you find yourself becoming upset and wish the procedure to be stopped, please call out and the experimenter will stop
the procedure. Finally, the experimenter will announce the end of the procedure when it is finished. Do you have any questions or concerns before we begin?”
Imaginal Delivery of Metaphor Script

I am going to spend some time now discussing a way that you can approach the upcoming breathing task, and a helpful way of approaching your emotions in general. I would like you to follow along and consider whether this fits with your experience. You came into this study because you completed some questionnaires over the phone and one of them was about worries and fears related to anxiety symptoms. And on this questionnaire, you endorsed anxiety about certain thoughts, physical sensations, and social situations (thoughts shown on screen). Now with these concerns in mind, consider this Chinese Finger Trap. A finger trap is a tube of woven straw, about five inches long and half an inch wide. And imagine that this is something that you may have played with as a child. Now imagine sliding one index finger into each end of this tube. If you did that I bet your natural, instinctive reaction would be to escape. So imagine that after you fully insert your fingers, you try pulling them out. If you did that, you’d notice that it’s not working very well and that the tube catches and tightens. In fact it may get worse, and you may experience discomfort and frustration as the tube squeezes your fingers and reduces circulation. You may even feel a little confused. Pulling out of the tube seems like a natural and logical way to free yourself from the finger trap. Yet it doesn’t work. The harder you try to pull out of the trap, the more stuck you are. And it isn’t that you aren’t trying hard enough. You’re probably trying very hard to get out of the trap. But, the more you try to pull out, the harder it becomes. When you imagine the finger trap, pulling away doesn’t seem to work does it. So instead of pulling out, imagine doing something counterintuitive by pushing your fingers in rather than out. And imagine what would happen to your fingers if you did that. It would gives you more space, more wiggle
room—it frees your hands so that you’re able to do the things that matter to you. And this is what acceptance offers. When you acknowledge discomfort, worry, and other unpleasant physical sensations and thoughts, and make wiggle room for them, allowing them to be, without doing anything about them and without trying to make them go away, this will give you enough space to move around and ultimately choose important directions in life just as pushing into a finger trap allows your hands to be free as you imagined. And that’s exactly how it works with anxiety. You may want to get away from things that scare you like certain unpleasant physical sensations or thoughts. We often try all sorts of things to pull away from our emotions, such as avoiding situations that might bring up these emotions or distracting ourselves from how we feel. But what happens when you keep on pulling away from what you have? The more you pull away from your anxiety, the more the trap tightens, and the more stuck you are. Trying to get rid of anxious thoughts and feelings, trying to reduce them when they’re there, trying not to have them come back when they’re gone often creates even bigger problems, and may actually increase the frequency and intensity of these same thoughts and feelings in the long term and get in the way of how we want to live our lives. As you imagined with the finger trap, pulling away from our anxiety may seem like a natural and logical way to free yourself from the anxiety trap. But this struggle will likely only bring you more discomfort and life problems and get in the way of what’s important to you. In a few minutes we are going to begin the breathing exercise that I mentioned earlier. During this exercise I would like you to pay attention to whatever anxious thoughts, feelings and physical sensations show up for you. And instead of trying to actively control them or push them away, I’d like you to try to lean into them, like you imagined doing with the
finger trap, embrace them, and let go of the struggle. Remember, the harder that you try to “Not feel anxious” the more unhelpful that might be and the more anxiety you may feel. Instead of battling with and trying to pull away from your anxiety, take a step back from the struggle, lean into your anxiety, and see what happens.
Behaviorally Enacted Delivery of Metaphor Script

I am going to spend some time now discussing a way that you can approach the upcoming breathing task, and a helpful way of approaching your emotions in general. I would like you to follow along and consider whether this fits with your experience. You came into this study because you completed some questionnaires over the phone and one of them was about worries and fears related to anxiety symptoms. And on this questionnaire, you endorsed anxiety about certain thoughts, physical sensations, and social situations (thoughts shown on screen). Now with these concerns in mind, pick up the Chinese finger trap in front of you. A finger trap is a tube of woven straw about 5 inches long and half an inch wide. And this is something that you may have played with as a child. Now go ahead and slide one index finger into each end of the tube like this (model). When you do that, I bet your natural, instinctive reaction is to escape. So after you fully insert your fingers, try pulling them out (model). You may notice that it’s not working very well and that the tube catches and tightens. In fact, it may be getting worse and you may experience discomfort and frustration as the tube squeezes your fingers and reduces circulation. You may even feel a little confused. Pulling out of the tube seems like a very natural and logical way to free yourself from the finger trap. Yet it doesn’t work. The harder you try to pull out of the trap, the more stuck you are. And it isn’t that you aren’t trying hard enough. I’m sure your trying very hard to get out of the trap. But, the more you try to pull out, the harder it becomes. So when you look at the finger trap, pulling away doesn’t seem to work does it. So, instead of pulling out, do something counterintuitive by pushing your fingers in rather than out (model). See what happens to your hands fingers you do that. This gives you more space, more wiggle room-it frees
your hands so that you are able to do the things that matter to you. And this is what acceptance offers. When you acknowledge discomfort, worry, and other unpleasant physical sensations and thoughts, and make wiggle room for them, allowing them to be, without doing anything about them and without trying to make them go away, this will give you enough space to move around and ultimately choose directions important in life, just as pushing into the finger trap allows you’re hands to be free. That’s exactly how it works with anxiety. You may want to get away from things that scare you like certain unpleasant physical sensations or thoughts. We often try all sorts of things to pull away from our emotions, such as avoiding situations that might bring up these emotions or trying to distract ourselves from how we feel. But what happens when you keep on pulling away from what you have? The more you pull away from your anxiety, the more the trap tightens, and the more stuck you are. Trying not to have anxious thoughts and feelings, trying to reduce them when they’re there, trying not to have them come back when they’re gone often creates even bigger problems, and may actually may increase the frequency and the intensity of these same thoughts and feelings in the long term and get in the way of how we want to live our lives. As you experienced with the finger trap, pulling away from anxiety and fear may seem like a natural and logical way to free yourself from the anxiety trap. But this struggle will likely only bring you more discomfort and life problems and get in the way of what’s important to you. In a few minutes we are going to begin the breathing exercise that I mentioned earlier. During this exercise I would like you to pay attention to whatever anxious thoughts, feelings and physical sensations show up for you. And instead of trying to actively control them or push them away, I’d like you to try to lean into them, like you did with the finger trap,
embrace them, and let go of the struggle. Remember, the harder that you try to “Not feel anxious” the more unhelpful that might be and the more anxiety you may feel. Instead of battling with and trying to pull away from your anxiety, take a step back from the struggle, lean into your anxiety and see what happens.
Appendix D: Experimental Self-Report Measures

Manipulation Check 1

Please answer the following questions based on your understanding of the strategy that you just learned.

1. During the upcoming task, if I experience unpleasant feelings or emotions, I will:
   a. Try to get rid of them by focusing on them and pushing them away.
   b. Try not to focus on the symptoms by distracting my attention.
   c. Try to evaluate the true danger of the situation and bring my thoughts in line with this.
   d. Tell myself that it will be over soon.
   e. Focus on the sensations, lean into them, accept them, and let them be.

2. According to the strategy that I just learned, when I feel anxious unexpectedly, it would be most helpful for me to:
   a. Accept my emotions and focus my attention on my feelings.
   b. Stay in control of my emotions at all times by pushing the anxious feelings away.
   c. Get out of the situation immediately.
   d. Try to determine why the situation is resulting in my anxiety and whether this reaction is reasonable.
   e. Try to distract myself from feeling anxious by focusing on other things.

3. How useful do you expect the strategy that you learned will be for you during the upcoming breathing exercise?
   a. Not at all useful
   b. A bit useful
   c. Somewhat useful
   d. Very useful
   e. Extremely useful

4. How engaging did you feel the video was?
   a. Not at all
   b. A bit
   c. Somewhat
   d. Very
   e. Extremely

5. How familiar are you with the Chinese Finger Trap?
   a. Not familiar at all
   b. Somewhat familiar
   c. Very familiar

6. How often do you use this strategy in everyday life?
   a. Not at all
   b. Sometimes
   c. Often
   d. Very Often
VAS Evaluative Rating Scales

Read each question below and rate your answer by placing a mark (/) anywhere along the line for each question. Base your answers on the sensations that you are CURRENTLY experiencing.

1) How distressed do you feel?

| Not at all | .............................. | Extremely Distressed |
| 0          | 50                       | 100 Distressed      |

2) How intense are your bodily reactions?

| Not at all | .............................. | Extremely Intense |
| 0          | 50                       | 100 Intense       |

3) How upsetting are your thoughts?

| Not at all | .............................. | Extremely Upsetting |
| 0          | 50                       | 100 Upsetting      |

4) How fearful/anxious are you?

| Not at all | .............................. | Extremely Fearful |
| 0          | 50                       | 100 Fearful       |

5) How strong is your urge to escape the situation?

| No | .............................. | Extreme Urge |
| Urge 0 | 50                       | 100 Urge |

6) How much are you struggling to control your thoughts, feelings and bodily reactions?

| No | .............................. | Extreme Struggle |
| Struggle 0 | 50                       | 100 Struggle |

7) How accepting are you of your thoughts, feelings and bodily reactions?

| No | .............................. | Extreme Acceptance |
| Acceptance 0 | 50                       | 100 Acceptance |

8) How much do you buy into your unpleasant thoughts and physical discomfort?

| Not at all | .............................. | Extremely |
| 0          | 50                       | 100       |
Below is a list of symptoms which various people have noticed during the type of procedure you just underwent. These experiences are very individual: some people notice almost all the symptoms, others notice hardly any. For each symptom listed below indicate if you experienced it just now by circling either "yes" or "no". If you did experience a symptom, rate how strongly you felt it using any of the numbers from 0 to 8 from the scale below.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Yes</th>
<th>No</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chest tightness or chest pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Pounding or racing heart</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Dizziness, lightheadedness, or unsteadiness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Trembling or shaking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Breathlessness or smothering sensation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Faintness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Numbness or tingling in face or extremities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Choking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Sweating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Hot flushes or cold chills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Feeling unreal or in a dream</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Nausea or abdominal distress</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Fear of dying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Fear of going crazy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Fear of losing control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Sensation of panic or fear</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please rate how safe you felt throughout the procedure (Circle one number):

<table>
<thead>
<tr>
<th>Safe</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Very</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Please rate how much control you felt you had over the sensations during the procedure (Circle one number):

<table>
<thead>
<tr>
<th>Control</th>
<th>Slight</th>
<th>Moderate</th>
<th>Much</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Please rate how anxious you felt during the procedure (Circle one number):

<table>
<thead>
<tr>
<th>Anxious</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Very</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

When you first noticed the symptoms which you listed above, did you have any of the following thoughts:

I feel relaxed: Yes____ No____
I feel like I might be dying: Yes____ No____
This is dangerous: Yes____ No____
There is nothing to fear: Yes____ No____
This is quite pleasant: Yes____ No____
I am going to lose control: Yes____ No____
I am going to faint or fall: Yes____ No____
This is exciting: Yes____ No____
I need help: Yes____ No____
I am safe here: Yes____ No____
Something is wrong: Yes____ No____
This isn't so bad: Yes____ No____
**Manipulation Check 2**
Using the scales below, please indicate how much you used each of these strategies (Column A) and how useful they were (Column B) during the carbon dioxide breathing exercise.

**In Column A:**
Using the scale below, please indicate how much you used each of these strategies during the breathing exercise (Please do not take into account how much you were asked to use each strategy. Rather, record how much you actually did the following during the breathing exercise).

<table>
<thead>
<tr>
<th>Never</th>
<th>Some of the time</th>
<th>Frequently</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-----</td>
<td>1----------------</td>
<td>2-----------</td>
<td>3-----------------</td>
<td>4-----------------</td>
</tr>
<tr>
<td>5-----</td>
<td>6----------------</td>
<td>7-----------</td>
<td>8-----------------</td>
<td>-----------------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tell yourself to not feel anxious.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Ask yourself if your thoughts are accurate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Observe your feelings without trying to change them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Try to objectively evaluate your situation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Think of a pleasant event to change how you were feeling.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Allow yourself to experience whatever emotions came up for you.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Try to control your physical and emotional response to the anxiety-producing gas without changing your thoughts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Lean into your symptoms, allowing yourself to feel them fully.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Change the content of your negative thoughts to be more realistic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Other strategy/strategies (please name)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Please rate how likely you would be to use the strategy that you were taught in the future.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Overall, how useful was the finger trap metaphor during the CO₂ procedures?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. How meaningful or impactful was the strategy that you learned during the CO₂ procedures?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**In Column B:**
Please return to the questions above and, if you used that strategy, rate how useful it was for coping with the anxiety you were experiencing on the following scale:

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Somewhat</th>
<th>Moderately</th>
<th>Very</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-----------</td>
<td>1---------</td>
<td>2----------</td>
<td>3-----</td>
<td>4---------</td>
</tr>
</tbody>
</table>
Willingness to Participate

Please read the following question and write your response in the blank. Please note that your response will not affect your compensation for participation in the experiment or your time spent in the laboratory.

1. Will you participate in another carbon dioxide breathing exercise right now?

0 = No, I will not participate
1 = Yes, I will participate

Response: _____

2. How willing are you to participate in another carbon dioxide breathing exercise right now?

0 = Not at all willing
1 = A little bit willing
2 = Mostly willing
3 = Very willing
4 = Definitely willing

Response: _____

3. Would you be willing to undergo this procedure again with a more intense version of the CO₂?

0 = Not at all willing
1 = A little bit willing
2 = Mostly willing
3 = Very willing
4 = Definitely willing

Response: _____
Appendix E.
CONSENT FORM (for paid participation)

INTRODUCTION: You have agreed to participate in a research study focused on acceptance techniques commonly used in therapy. The study will be explained to you by Kristin Herzberg, M.A. (Graduate Student, SUNY Albany), John P. Forsyth, Ph.D. (Professor of Clinical Psychology, SUNY Albany), or one of the other associated project staff.

PURPOSE OF THE STUDY: The purpose of this study is to examine how people's thoughts, feelings, and bodily responses are influenced by acceptance techniques that are often used in therapy. This study is part of ongoing research designed to better understand the nature and treatment of fear and anxiety-related problems.

DESCRIPTION OF PROCEDURES: Your participation in the first portion of the research study will involve filling out a number of brief questionnaires that will take about thirty minutes to complete. You do not have to answer any questions on the questionnaires that you are not comfortable with. After completing the questionnaires, the next stage of the experiment will be approximately an hour and a half. It will involve learning an acceptance intervention technique before undergoing a procedure in which you will breathe larger than normal amounts of carbon-dioxide enriched air while your heart rate, breathing rate, and expired carbon dioxide levels are recorded. Throughout the experiment, you will be wearing a breathing mask over your nose, through which you will intermittently breathe either normal room air only or normal room air that is premixed with larger than normal concentrations of carbon dioxide (10% carbon dioxide mixed with 90% balanced room air). Your bodily responses will be continuously monitored by a trained research assistant throughout the procedure.

RISKS AND DISCOMFORTS: You may experience some discomfort during times when you are breathing room air which is premixed with larger than normal concentrations of carbon dioxide. The effects of breathing carbon dioxide-enriched room air may temporarily mimic anxious feelings and sensations, which include increased heart rate and breathing rate, shortness of breath, dizziness, and the possibility of fainting or having a panic attack. These effects are normal and are expected to disappear quickly when you return to breathing normal room air. Individuals with asthma, cardiac problems, respiratory diseases, high blood pressure, epilepsy, seizure disorders, sleep apnea, kidney disease, morbid obesity, or those that might be pregnant should not participate in this study. Should you experience abnormally high physiological arousal or distress, such as rapidly increasing heart rate or reported discomfort, we will immediately terminate the study. In the unlikely event that you experience an adverse reaction to the experimental procedures, we will provide you with additional information about anxiety disorders and referral information for treatment with local mental health providers in the community who have expertise in anxiety/mood disorders.

WITHDRAWAL PROCEDURES: You are free to withdraw your consent to participate in this study at any time. In order to withdraw during the questionnaire portion of the study, you only need to stop filling out the questionnaire and inform a member of the laboratory staff. During the portion of the study when you will be wearing the breathing mask, you will be observed by a member of the laboratory staff at all times and should notify them if you would like to withdraw from the experiment.

BENEFITS: The results of this study may benefit you directly because you will be learning a strategy that you may consider useful, particularly at times when you are feeling anxious. Additionally, the knowledge gained may help us understand factors related to why some people
become bothered and fearful over certain bodily sensations. The results may also help to develop better treatments for people who suffer from anxiety-related disorders.

PAYMENTS TO SUBJECT FOR PARTICIPATION IN THE STUDY: You will receive $20 cash for participation in this study.

VOLUNTARY PARTICIPATION: Your participation in this research is completely voluntary. You are free to discontinue your participation at any time without penalty or loss of benefits to you. You may also choose not to answer any questions for any reason. You have the opportunity to ask questions about areas you do not understand about the research. One copy of this document will be kept together with the research records of the study and you will be given a copy to keep.

CONFIDENTIALITY: Any information obtained as a result of your participation in this research will be kept as confidential as legally possible. All information obtained in this study is strictly confidential unless disclosure is required by law. In addition, the Institutional Review Board, the sponsor of the study (e.g., NIH, FDA, etc.), and University or government officials responsible for monitoring this study may inspect these records. Your research records, just like hospital records, may be subpoenaed by court order or may be inspected by federal regulatory authorities. Your name and any identifying information will not appear in any publications that may result from this research.

CONTACT PERSONS: If you have any questions or concerns regarding this research, you may contact any of the above noted investigators at 442-4862. If you have any questions concerning your rights as a research participant that have not been answered by the investigator or if you wish to report any concerns about the study, you may contact the University at Albany's Office of Regulatory Research Compliance at 518-442-9050 or orrc@albany.edu.

I have read, or been informed of, the information about this study. I hereby consent to participate in this study.

____________________________________________
Signature of Subject Date

____________________________________________
Signature of Investigator Date
or Investigator’s Representative
CONSENT FORM (for research pool)

INTRODUCTION: You have agreed to participate in a research study focused on acceptance techniques commonly used in therapy. The study will be explained to you by Kristin Herzberg, M.A. (Graduate Student, SUNY Albany), John P. Forsyth, Ph.D. (Professor of Clinical Psychology, SUNY Albany), or one of the other associated project staff.

PURPOSE OF THE STUDY: The purpose of this study is to examine how people's thoughts, feelings, and bodily responses are influenced by acceptance techniques that are often used in therapy. This study is part of ongoing research designed to better understand the nature and treatment of fear and anxiety-related problems.

DESCRIPTION OF PROCEDURES: Your participation in the first portion of the research study will involve filling out a number of brief questionnaires that will take about thirty minutes to complete. You do not have to answer any questions on the questionnaires that you are not comfortable with. After completing the questionnaires, the next stage of the experiment will be approximately an hour and a half. It will involve learning an acceptance intervention technique before undergoing a procedure in which you will breathe larger than normal amounts of carbon-dioxide enriched air while your heart rate, breathing rate, and expired carbon dioxide levels are recorded. Throughout the experiment, you will be wearing a breathing mask over your nose, through which you will intermittently breathe either normal room air only or normal room air that is premixed with larger than normal concentrations of carbon dioxide (10% carbon dioxide mixed with 90% balanced room air). Your bodily responses will be continuously monitored by a trained research assistant throughout the procedure.

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BENEFITS: The results of this study may benefit you directly because you will be learning a strategy that you may consider useful, particularly at times when you are feeling anxious.
Additionally, the knowledge gained may help us understand factors related to why some people become bothered and fearful over certain bodily sensations. The results may also help to develop better treatments for people who suffer from anxiety-related disorders.

RESEARCH CREDITS FOR PARTICIPATION IN THE STUDY: You will receive 2 credits for participating in this study.

VOLUNTARY PARTICIPATION: Your participation in this research is completely voluntary. You are free to discontinue your participation at any time without penalty or loss of benefits to you. Refusal to participate or withdrawal will involve no penalty or loss of benefits and will not affect your class standing. You may also choose not to answer any questions for any reason. You have the opportunity to ask questions about areas you do not understand about the research. One copy of this document will be kept together with the research records of the study and you will be given a copy to keep.

CONFIDENTIALITY: Any information obtained as a result of your participation in this research will be kept as confidential as legally possible. All information obtained in this study is strictly confidential unless disclosure is required by law. In addition, the Institutional Review Board, the sponsor of the study (e.g., NIH, FDA, etc.), and University or government officials responsible for monitoring this study may inspect these records. Your research records, just like hospital records, may be subpoenaed by court order or may be inspected by federal regulatory authorities. Your name and any identifying information will not appear in any publications that may result from this research.

CONTACT PERSONS: If you have any questions or concerns regarding this research, you may contact any of the above noted investigators at 442-4862. If you have any questions concerning your rights as a research participant that have not been answered by the investigator or if you wish to report any concerns about the study, you may contact the University at Albany's Office of Regulatory Research Compliance at 518-442-9050 or orrc@albany.edu.

I have read, or been informed of, the information about this study. I hereby consent to participate in this study.

____________________________________________
Signature of Subject Date

__________________________________
Signature of Investigator Date
or Investigator's Representative